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VOL. X FEBRUARY, 1929 No. 2

ZINC IONIZATION IN RELATION TO CHRONIC OTORRHOEA*

DR. A. R. FRIEL
LONDON

The basic factor in the maintenance of chronic otorrhoea is *sepsis*; and as chronic sepsis occurs in so many places in the body there is much of general interest in the treatment of this disease.

Chronic otorrhoea is frequently met with; the ear can be examined by sight and the conditions present seen and the results of treatment quite easily verified. Thus it is an excellent field in which to test the value of an antiseptic treatment like zinc ionization. In testing an antiseptic treatment it is plain that ears should be chosen in which the suppuration is due to sepsis in an accessible position, and that sepsis alone should be the condition responsible for keeping up the discharge.

From the clinical point of view there are two kinds of sepsis. There is sepsis *in* the tissues, and there is sepsis *on* the tissues. Erysipelas is an illustration of sepsis *in* the tissues, while a great mass of affections such as chronic otorrhoea, chronic infection of the nasal sinuses, many wounds which have become septic, many cases of endometritis and some chronic abscesses and ulcers are examples of sepsis *on* the tissues. For this form of sepsis zinc ionization which we owe to Professor Leduc of Nantes has proved to be an effective remedy.

The writer is specially concerned (1) to make clear the conditions in the ear in which it can be applied with the confidence that its use will result in an immediate or speedy cessation of discharge.

*Read at Seventh Annual Meeting of the American College of Physical Therapy, Chicago, Oct. 9, 1928.

(2) To indicate the conditions that demand preliminary treatment before using zinc ionization.

In any particular case of chronic otorrhoea which comes to us for treatment, it is necessary to form an opinion as to what is keeping up the discharge, and this is done by examining the ear, nose and throat.

The diagrams show various conditions which may be found in the ear.

Table 1 gives the different causes of chronicity and the incidence of these in a considerable number of ears which were treated at clinics for chronic otorrhoea. It also shows that in a certain class of cases a favorable result was, we might say, regularly obtained, whereas in another class it was frequently obtained, and in a third class only exceptionally obtained.

It is useful to state in general terms what these various classes imply:

Firstly, that there are cases which owe their chronicity to sepsis alone in an *accessible* position in the ear.

Secondly, that there are also cases which owe their chronicity to accessible sepsis in the ear plus another factor there also.

Thirdly, that there are others due to accessible sepsis in the ear plus inflammation in a neighboring organ.

Fourthly, that some others depend on sepsis in an *inaccessible* position in the ear.

Lastly, that there are cases in which two or more of the above conditions are present.

Table 2 shows the results obtained in the tympanic sepsis cases. Here the sepsis was almost always easily accessible and no other factor besides sepsis was detected.

Fig. 1.—Tympanic sepsis is diagnosed by the presence of septic fluid in the tympanum and by the absence of any indication of sepsis in the attic or mastoid, or of a polypus, or of rhinitis or of inflamed tonsils or inflamed adenoids.

TABLE NO. 1

OTOLOGICAL CLASSIFICATION AND SUMMARY OF RESULTS OF EARS TREATED WITH IONIZATION.

Cause of Chronicity.	*Total.*	*Cured.*	*Lost sight of.*	*Still under treatment.*	*Sent for operation or other treatment.*
1. Tympanic Conditions					
a. Tympanic Sepsis	251	234	17		
b. T.S.+Granulations	82	61	16	5	
c. T.S.+Polypus	29	18	5	3	3
d. T.S.+Caries	4	2	2		
e. T.S.+Cholesteatoma	3	1	2		
f. T.S.+Other conditions	3	2	1		
2. Tympanic Conditions +Involvement of the Eustachian Tube, Nose, Pharynx or Mouth	37	18	9	4	6
3. Tympanic Conditions +Attic or Mastoid	173	35	40	11	87
No Prev. Operation		24	33	6	72
Operation Already		11	7	5	15
4. Tympanic Conditions +Ext. Otitis	14	9	2	1	2
+Stricture of Meatus	1	1			
5. Ext. Otitis	12	9	2	1	
6. Tympanic Conditions +Cause Undeterm'd	7	4	2	1	
TOTAL:	616	394	98	26	98

These ears were of children seen once a week or once a fortnight and who received no treatment to their ears in the interval. The treatment given was zinc ionization without or with the insufflation of boracic powder into the meatus after ionization. We are dealing in all these patients with living tissues and often these tissues are inflamed. When inflammation exists it takes some hours after the ear has been ionized for it to subside and during this time they secrete fluid. Boracic powder absorbs this fluid and prevents the growth of germs.

Again it will be noticed that several of the cases showed some discharge a week after they were ionized. If it is very slight, experience has proved that cleansing the tympanum and blowing in some of the powder is sufficient to bring about a dry ear.

The rapid cessation of discharge, as well as the fact that it was not necessary to send any of these patients away for any other form of treatment and also that their number is considerable, is, in the writer's opinion, convincing that we have in zinc ionization a reliable method of treatment for sepsis in an *accessible position in the* ear.

TABLE NO. 2

ANALYSIS OF TREATMENT OF TYMPANIC SEPSIS CASES

A. CURED

Number of Cases.	*Number of Ionization Treatments.*	*Number of Visits till Discharge Ceased.*
143	1	1
41	1	2
7	1	3
4	1	4
1	1	6
1	1	8
9	2	2
10	2	3
8	2	4
4	2	5
1	2	6
2	3	3
1	3	4
1	4	6
1	4	7
234		

B. LOST SIGHT OF.

8	1 visit,	1 ionization
3	2 visits,	1 ionization
3	3 visits,	1 ionization
1	3 visits,	2 ionizations
1	4 visits,	2 ionizations
1	4 visits,	3 ionizations
17		

This is the first fact of scientific and also of economic importance to which attention is drawn. The second has to do with the help that zinc ionization gives in forming a diagnosis in difficult cases. By this is not meant that because an ear still discharges the cause of chronicity is something besides sepsis, but that it is possible from the improvement which follows ionization to determine and demonstrate what the something else is, in a particular case. Zinc ionization coagulates albumen and the coagulum acts as a barrier between the tissues and the outside world. As a result inflammation diminishes, and as swelling then becomes less it becomes possible to distinguish a small polypus, for example, which was indistinguishable in the general swelling of the tissues. Again it is a routine practice to aspirate every ear to find out whether there is pus in some recess. Suction at the first visit does not always reveal this, but a few days after ionization when there is less swelling it becomes quite easy to discover it, if it exists. When the diagnosis is made the treatment proper to the case can be begun.*

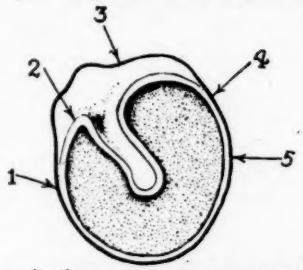

Fig. 2.—On aspiration mucous may appear at 1 from the eustachian tube.
Pus may appear at 2 from the anterior part of the attic.
Pus may appear at 3 from the posterior part of attic or from mastoid antrum.
Pus may appear at 4 from the mastoid antrum.
Pus may appear at 5 from a cell in the mastoid.

The results obtained by zinc ionization in tympanic sepsis give us a clue how to proceed to deal with these other cases. We try (1) to gain access to positions difficult of access by using special instruments; (2) to convert inaccessible positions into accessible positions by operation, and then use ionization; (3) to reduce multiple factors to the single factor, sepsis, and then treat this by ionization.

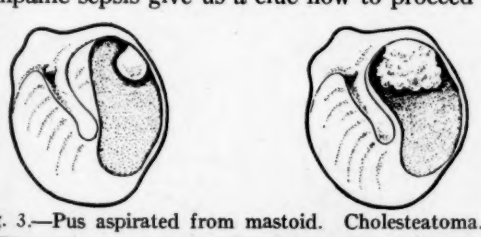

Fig. 3.—Pus aspirated from mastoid. Cholesteatoma.

*The illustrations are nearly all from the author's small book, "Notes on Chronic Otorrhea," courtesy of Messrs. Wright & Sons, Bristol, Publishers.

If we consider those cases of chronic otorrhoea in which the discharge is kept up by one or more factors in the tympanum additional to sepsis, we will find that a large number are amenable to treatment. Polypi or granulations (illustrations a, b, c) are the most common additional factors here. If a polypus is quite small it can be removed by forceps and the ear ionized at once to avoid any risk of infection through the raw surface where it was attached. If larger it may be destroyed by electrolysis. When the point of attachment can be seen the electrolysis needles are pushed into the tissue of the polypus as near to its attachment as possible, in order to destroy the nutrient vessels. The needles are made of zinc (illustrations d, e), one of which is attached to the positive and the other to the negative pole. One dry cell or two joined in series will give sufficient current. The needles can be held in position for two or three minutes. If the polypus is large it is not possible to see its point of attachment, but it can be destroyed piecemeal. Large granulations can be efficiently treated by electrolysis while smaller ones can be touched by nitrate of silver fused on the end of a fine silver probe.

Fig. a—Polypus appearing in tympanum from aditus region. Attic polypus.

In cases where there is inflammation in a neighboring organ, such as the nose, as well as

Fig. b—Polypus. Electrolysis of polypus.

sepsis in the ear, it is necessary to treat the condition in both areas. There may be an empyema of the maxillary antrum or there may be an accumulation of mucus behind a deflection of the septum.

Rhinitis in children is often kept up by swelling of the inferior turbinals blocking the airway. For such the method called "diastolization," devised by Dr. Gautier* of Paris, is of great use. Many patients by its help recover with surprising rapidity. The hollow bougies are readily introduced and can be rhythmically distended. They stimulate the nerves in the mucous membrane and in a few days the nose shows a great improvement.

Fig. c—Tympanic sepsis and granulations. Tympanic sepsis and granulations and caries. Large granulation mass at floor. Caries of handle of malleus.

In the writer's opinion the presence of chronic otorrhoea is not an indication for removing tonsils which show a moderate degree of hypertrophy, or adenoids which do not obstruct the airway. Tonsils which show definite chronic inflammation are prejudicial to an ear recovering or remaining well. These should be removed.

The mastoid antrum is nearly always beyond reach of direct treatment by fluid introduced into the ear via the meatus. When the discharge from the antrum, which appears on aspiration at the upper posterior portion of the tympanum is slight and mucoid, it is worth while attempting to treat the ear without operation. As much fluid should be aspirated from the antrum as can be drawn out by the suction speculum and then the tympanum should be ionized. Special care should be taken in preparing the ear for ionization so that the zinc solution may cover as large an area as possible. The

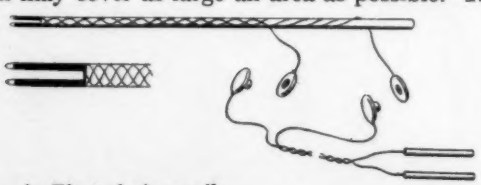

Fig. d—Electrolysis needles.

*La Presse Medicale, 1924, p. 139.

diminution of swelling of the tympanic tissues following ionization may be sufficient to allow of free exit of mucus from the antrum. A little boracic powder is blown into the ear after ionization to try and absorb discharge and prevent irritation of the tympanic mucous membrane. Frequently a case of this sort recovers. Where, however, the discharge from the antrum is foetid or distinctly purulent, recovery is not to be expected without operation.

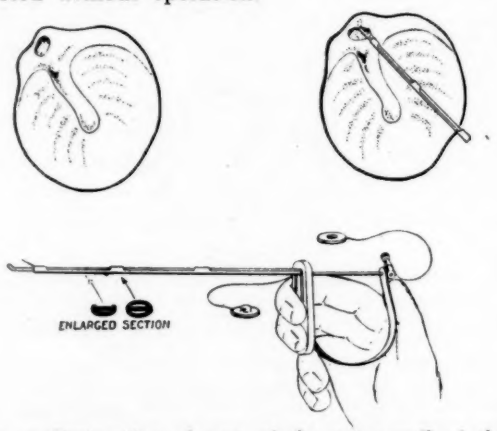

Fig. e—Destruction of part of the outer wall of the attic in order to make the area of sepsis more accessible.

When a small amount of pus is present at Shrapnell's membrane and the perforation is small, it is reasonable to enlarge the perforation with the hope of making the area of sepsis accessible. A portion of the outer wall of the attic can be destroyed by electrolysis. The illustration (e) shows a convenient method of doing this. The electrode which passes through the perforation has the surface adjacent to the outer attic wall coated with zinc. The surface which might touch the head or neck of the malleus is varnished.

Bonain's solution is used as a local anasthetic where part of the outer attic wall, or part

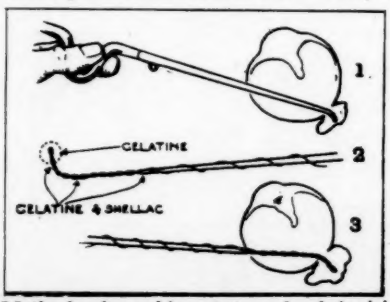

Fig. f—Method of washing out and of ionizing cell in mastoid.

of the remains of the drum membrane are to be destroyed. It is sometimes advisable to destroy the tissues between a perforation in Shrapnell's membrane and a perforation in the drum, and this can also be done by electrolysis.

Occasionally cases are met with in which the area of sepsis which is inaccessible is limited to the area around the descending process of the incus. A slight amount of discharge can be aspirated from a "chink" between the lower margin of the remains of the drum and the upper surface of the promontory. By destroying the remains of the drum adjacent to this "chink" the area is made much more accessible.

The author has seen some ears in which a week after the ionization of the tympanum a little pus is aspirated from a cell opening into the posterior part of the tympanum or on to the posterior wall of the meatus close to the tympanum. A granulation may be visible at the opening in the latter position. A little cocain and adrenalin solution is applied to the cell and it is then washed out by a canula with warm water, and afterwards filled with zinc solution.

To distribute the current to the walls of the cell an illustration (g) shows a device which has given much help. A twisted loop of silk covered wire is fastened to a light piece of wood. The wire is dipped into gelatin containing some zinc salt and allowed to dry and then varnished with celluloid except at the very tip. The silk and gelatin prevent the wire touching the tissues, and the varnish prevent the current being given off except at the tip. The end of the loop is passed through the narrow opening into the cell.

The writer has had much success in these cases, whereas with attic cases it is only in a few intsances that he has been successful.

In every case *accessibility* is the crux of the problem. If it is not possible to gain access by some device an operation is necessary to make the septic area accessible.

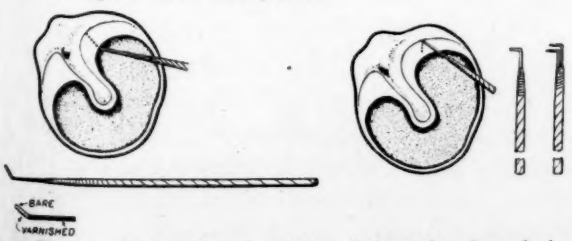

Fig. g—Destruction of portion of drum by electrolysis.

It should be stated that zinc ionization is not a method of producing immunity and if a person goes swimming or falls a victim to influenza, measles or a severe cold he may suffer a reinfection of his tympanum and consequent discharge. Otherwise a patient who has recovered is not likely to suffer from recurrence of the discharge.

The percentage of all cases of chronic otorrhoea which can be readily cured is estimated at 60%, a further 30-35% can be cured with some trouble. These are the cases in which a polypus for example is present, or where there is some nasal affection. The remaining 5-10% require some form of mastoid operation.

From the efficacy of zinc ionization in dealing with sepsis in chronic otorrhoea it may be confidently applied for the treatment of sepsis in other parts of the body, but making the same provisos and limitations.

Table III shows in general outline the indication for treatment drawn from the cause of chronicity.

INDICATIONS FROM THE CAUSE OF CHRONICITY AS TO TREATMENT

Cause of Chronicity

1. Accessible sepsis: e. g., most cases of tympanic sepsis.

2. Accessible sepsis with second factor in ear: e.g., polypus.

3. Accessible sepsis with inflammation in a neighboring organ: e.g., rhinitis.

4. Inaccessible sepsis: (a) accessible with difficulty: e.g., cell in mastoid opening directly into tympanum; (b) totally inaccessible: e.g., most cases of attic disease, and of chronic mastoiditis.

Treatment

Zinc Ionization with or without boracic powder insufflation. In slight cases it is not necessary to ionize. Boracic powder alone is sufficient.

Remove second factor, then ionize ear.

Treat neighboring organ and ionize ear.

(a) Use special instrument to gain access: (1) attic canula; (2) gelatin-covered wire; (b) make area of sepsis accessible: e.g., destroy outer attic wall, ossiculectomy, partial or complete mastoid operation, and then ionize.

THE TRANSMISSION OF ULTRAVIOLET LIGHT THROUGH THE HUMAN SKIN*

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Experimental and clinical observations about the biologic effects of ultraviolet light are continuously increasing. We mention the treatment of lupus by the Finsen light, of tuberculosis by the natural sunlight, of rickets and many skin diseases by the mercury quartz lamp, and the sterilization of bacteria and the activation of foods against rickets by ultraviolet exposures. Determinations have already been made for some of the reactions, indicating in which part of the spectrum the strongest reactions occur. Hausser and Vahle [1] [2] e. g., have proved by an excellent investigation that the production of an erythema is limited to the small range between 240 and 310$\mu\mu$ with two sharp maxima near 300 and 250$\mu\mu$. The antirachitic action has been determined recently by Sonne and Rekling[3] as covering the range between 302 and 240$\mu\mu$ with a maximum at 280$\mu\mu$. Several hypotheses have been advanced for the mechanism of the action of the light. Several authors suggest a primary effect upon the blood, others upon the nerve endings, others upon the lipoids of the epidermis, etc. All these hypotheses are still in need of a secure foundation as long as we do not know to what depth the various qualities of light penetrate, and by which they, dead or living tissues, are absorbed. Such pronounced sensitivity maxima in the spectrum indicate that selective absorption plays an important part. Therefore, the exact study of the absorption of ultraviolet light by human tissue seems of prime importance. To the present time there exist very few observations, most of them qualitative, and even contradictory to each other.

Freund[4] (1901) after a short discussion of the older literature, describes the results of his measurements, made by use of a diffraction grating and the photographic plate. He determined the transmission of ultraviolet light through epidermis (blisters), skin (Thiersch' grafts), and blood (.17 mm. thick). He states that the visible and the ultraviolet light down to 325$\mu\mu$ penetrates the epidermis, while shorter waves are absorbed. He determines the absorption limit for blood as between the spectral lines F and G, i. e., between 486 and 431$\mu\mu$.

Busk,[5] (1903 and 1904) reviews the older literature and proves by his own experiments that red and yellow light penetrates up to about 5 cm. tissue (hand, wrist), while the blue and violet light does not penetrate, he finds that up to 23 per cent of the yellow, red and infra-red rays penetrate a rabbit ear, but only 1 per cent of the blue and violet.

Jansen[6] (1903 and 1904) reports about the property of bactericidal rays in penetrating the skin; he observes that 33 per cent of near ultraviolet (400-322$\mu\mu$) penetrates 1/10 mm. skin of the mouse, but 0.4 per cent only of the far ultraviolet (322-220$\mu\mu$).

Jansen claims that an exposure of 75 minutes Finsen light kills bacteria (prodigiosus) to a depth of 1.5 mm. and damages them to a depth of 4 mm. He thinks that the first effect is due to the far ultraviolet, the latter to the near ultraviolet and violet and blue rays.

Dhere[7] (1906) observes that the hematin shows a broad strong absorption near 400$\mu\mu$, and that light penetrates down to about 210$\mu\mu$.

Schultz[8] (1910) claims that human skin (body) transmits traces of ultraviolet to 240$\mu\mu$ and ears of young rabbits to 265$\mu\mu$.

While most of these investigations give only qualitative results, Hasselbalch[9] [10] published (1911) the results of his quantitative measurements of the ultraviolet absorption by human skin. He used children and foetal skin of .30 to 1.5 mm. thickness, and epidermis of .04 mm. thickness from a cantharides blister. Has-

*Read at sixth annual meeting, American College of Physical Therapy, Chicago, Nov. 3, 1927.

selbalch determined the transmission and the absorption coefficients by a quartz spectrograph and the photographic plate. From his experiments he calculated the transmission of .1 mm. skin as 59 to 55 per cent for violet, diminishing slowly to 30 per cent for 313$\mu\mu$, then abruptly to 8 per cent for 302$\mu\mu$, 2 per cent for 297 and as low as .01 per cent for 289$\mu\mu$. According to these last figures practically no radiation below 300$\mu\mu$ would reach the living parts of the skin. From Hasselbalch's measurements it seems that the epidermis has a stronger absorbing power than the bloodless corium.

In 1912 several papers of Henri[11] and his co-workers published quantitative figures about the absorption of oxyhemoglobin and hemoglobin. They register strong absorption bands near 414,4 and 430,8$\mu\mu$ respectively, near 278,8 and below 243,5 where very pronounced absorption occurs. They also investigated the absorption of egg albumen and of rabbit serum. The absorption of egg albumen increases rapidly near 305$\mu\mu$, reaches a maximum with 280$\mu\mu$, a minimum with 250$\mu\mu$ and then increases continuously toward the farther ultraviolet. With rabbit serum the first absorption band lies as low as 290$\mu\mu$, the maximum near 270$\mu\mu$, a minimum near 255$\mu\mu$, from where the far ultraviolet absorption starts.

Lindahl[12] (1913) made similar measurements of the lachrymal fluid and found a sharp absorption band at 296$\mu\mu$, and absorption maximum at 280$\mu\mu$, a minimum at 253.5$\mu\mu$ and strong increase toward the farther ultraviolet.

Mitschell[13] (1922) observed the transmission limit of the human finger nail (¾ mm. thick) at 326.5$\mu\mu$.

Bernhard[14] (1924) investigated the transmission of human skin by a mercury quartz lamp, by filters, and by the thermocouple in four spectral areas. He detected maximal penetration near 600 and strongest absorption near 300$\mu\mu$. The measurements were made 6, 24, and 48 hours post mortem, and show very little differences, especially in the ultraviolet area.

Macht, Bell and Elvers[15] (1925) report photographical absorption measurements of living skin. The slit of the spectrograph was brought beneath the skin of rabbits, cats and dogs. The spectral line, 280$\mu\mu$, could be observed through 1 to 2 mm. of skin; the wave length, 300$\mu\mu$, could be obtained through 3 to 4 mm. Also white and colored human skin was tried, but no quantitative figures are given.

E. V. Schubert[16] (1926) mentions the sharp absorption line of serum and blood near 300$\mu\mu$.

Kollath and Suhrmann[17] (1927) measured the absorption of oxyhemoglobin and plasma in blood. They describe a series of absorption bands in the yellow green and blue violet, near 340, 270 and 280, 257, with final absorption near 237$\mu\mu$. For plasma they find an absorption band near 280, with final ultraviolet absorption near 248$\mu\mu$.

In a short preliminary report Schultze and Rothman[18] (1927) point out that the nonsaponifiable, aceton soluble lipoids of the human epidermis show a sharp absorption limit at 313$\mu\mu$ and maximum absorption at 297$\mu\mu$. They find a similarity between the absorption curve of these lipoids and the one of the blood serum, and suggest that the lipoids are responsible for the skin sensitivity curve of Hausser and Vahle.

Pauli and Ivancevic[19] (1927) determined the absorption of skin (rabbit, men) for the long wave area between 580 and 1200$\mu\mu$, with spectrograph and thermo-element. They found the greatest penetration between 700 and 760$\mu\mu$ as 47.6 per cent through 2 mm. They measured a difference of only 4 per cent between the bloodless and blood-filled rabbit ear.

From these mostly qualitative and occasionally contradictory results it is difficult to come to a conclusion about the quantitative and qualitative distribution of the light in the tissue and to determine where the various components of the spectrum influence the organism in order to produce biological effects. Therefore, we have tried to measure the transmission of the ultraviolet and a portion of the visible light through human skin quantitatively. We have included a number of substances which accompany or represent a part of the skin, as fat, fascia, horn, blood and serum.

We have used two methods, the photo-electric and the photographic.

The photo-electric method appeared to us as the best one for quantitative results, way into the far ultraviolet. This exceeds the photographical method, because the produced and measured currents are in proportion to the light intensities to be measured; therefore, a scale of the optical density and a determination of time factors (Schwartzschild's law) is not needed. This method is superior to the thermo-electric, because it is extremely sensitive in the ultraviolet region and little sensitive for the longer wave area; no particular care against heat radiation is therefore necessary.

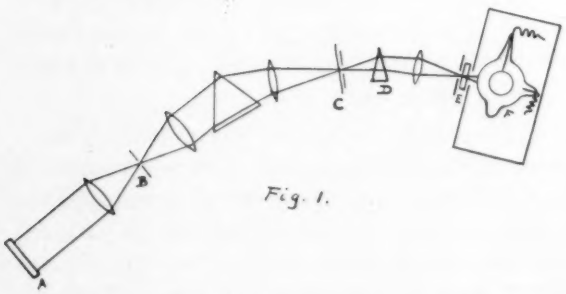
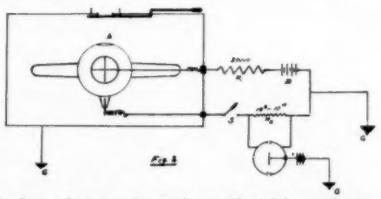


Fig. 1.

The light from a mercury arc (A), Fig. 1, was focused by means of a double quartz lens on the slit (B) of a Hilger quartz spectrograph. The mercury lines were made visible by means of fluorescent glass (C) and photographed on a glass plate. The principal mercury lines were determined by means of Kayser's tables. The walls of the spectrograph were carefully blackened and the chamber containing the prism was lined with black cloth, and diaphragms were introduced in the beam of light; in spite of these precautions quite a little scattered light was found superimposed on the lines. In order to separate the scattered visible light from the individual lines, the light leaving the slit was allowed to pass through a second slit and another prism (D). The scattered light could be seen on a white screen nicely separated from the light to be used. There was, besides, a trace of scattered light of the room which in the case of the weaker ultraviolet lines produced an effect of about 1 per cent of the total deflection. In order to eliminate this scattered light, a black tube was introduced covering the beam between the lens and the opening to the photo-electric cell. With all these precautions the readings were very consistent and no scattered light detectable. The biologic specimens (E) were inserted as close as possible to the photo-electric cell (F).

The photo-electric cell was of quartz and of the type used by J. Stebbins and J Kunz in stellar photometry. Potassium was sensitized by means of the spark in pure hydrogen; the hydrogen was replaced by argon and the tube sealed off. This quartz photo-electric cell was placed in a light-tight box containing a shutter and sulphur plugs for the insulation of the photo-electric current. The electric circuit of Fig. 2 con-

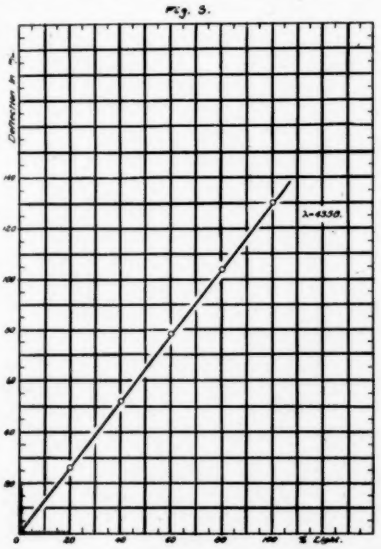


sists of the photo-electric cell (A), a battery (B) of 50 to 130 volts, a proctective resistance, R_1, of about 20,000 ohms, a switch and a graphite resistance, R_2 of 10^8 to 10^{10} ohms. The terminals of this resistance were connected to an electrometer (E), which gave about 30 mm. deflection for a potential difference of one volt between the quadrants. The needle was kept charged with a constant source of 80 volts. The sensitiveness of the circuit could be varied in wide limits by a simple change of the graphite resistance and by a change of the tension of the battery (B). The deflections of the electrometer needle were kept between 80 and 150 scale divisions at a distance of about three meters. The method here employed was that of a direct deflection. There are, of course, other methods in use, for instance, a null method and a constant deflection method, which are independent of the photometric law of the photo-electric cell. In special cells, however, the deflection or the photo-electric current is directly proportional to the light intensity, and this relation was tested for our cell and it was found to be a very good straight line as seen from Fig. 3. The direct deflection method has therefore been adopted.

The photo-electric method has two disadvantages: First, it works very slowly and it takes many hours to take the whole spectrum of a series of specimens; and therefore rechecks are required to determine the constancy of biologic preparations. Secondly, it is difficult to

determine penetrations of small fractions of 1 per cent on account of traces of scattered light; this makes the measurements near the end-absorption inaccurate.

These difficulties are overcome by the photographic method. A photographic plate of 8 to 10 absorption spectra for one specimen can be taken in less than a quarter of an hour. The specimens can be kept constant during this time without difficulty. The limits of penetration can be exactly determined, and the figures obtained for extremely weak penetration can be



obtained with great accuracy. The Schwarzschild factor was determined several times between .7 and .8. The exposure of the plate was changed, by use of a rotating sector and time variation in ratio of 100 to .03. The preparations were brought into closest contact with the slit; in case of fluids and of specimens kept between quartz plates, the distance was not more than 2 mm. Even with such a close contact, most of the biologic preparations scattered a noticeable amount of light away from the slit. This unavoidable error tends to lower the transmission, particularly for the part of the spectrum, in which true absorption is small. In comparison to the pronounced true ultraviolet absorption the scattering is of little importance, however.

With the photo-electric arrangement most of the scattered light was collected by the cell on account of the size of the cell which was great in ratio to the distance between the object and the cell. Accordingly a slight increase of that distance did not alter the readings appreciably.

The measurements were made with dead tissue, either from the body or from amputated limbs; the epidermis preparations were taken from blisters formed after Alpine, Kromayer, x-ray applications or by cantharides plaster.

A few preliminary measurements were performed in order to find out whether a detectable difference existed between the same tissue, dead or living. The right ears of one white and one black rabbit were amputated and put in Ringer's solution. After two days they were measured and compared with the two not amputated left ears. There was no detectable difference between the absorption of the dead and living ear.

Most of the preparations were kept over ice, in Ringer's solution; shortly before the measurements they were either placed between quartz plates, and from time to time moistened with Ringer's solution; or they were stretched out between two corks with a hole in the center and then moistened by submerging them in Ringer's solution between the measurements. It was very essential that the preparations were treated this way, because the transparency changed somewhat by drying out. By rechecks the constancy of the preparations could easily be tested. An exact determination of the absorption coefficient has not yet been tried. For this purpose it would have been necessary to determine the reflected energy for each wave length, to subtract it from the incident energy and compare this with the transmitted energy. According to the investigations of A. Schultze[20] (1926) and E. Dorno[21] (1926) the reflection is a maximum in the visible part of the spectrum and decreases rapidly toward the ultraviolet, where it amounts to only a few per cent of the incident energy.

Also the exact separation of pure absorption and the absorption due to scattering has not been carried through.

Finally it may be mentioned that over a large part of the spectrum pronounced fluorescence occurred. Therefore one has to assume that the radiation which penetrates the tissue consists to a large part of a longer wave length.

We have observed that the exponential law did not hold true for some of our measurements, in so far as for thicker layers the absorption coefficient grew smaller. This effect is to be expected on account of the three above mentioned factors. A pronounced reflection in the very upper layers has the same effect as a stronger absorption. The amount of scattering depends upon the volume of irradiated tissue, and more scattered energy is preserved in a thicker layer than in a thinner. Due to fluorescence the penetrating power of the radiation increases with the depth, until the primary radiation is absorbed and nothing but fluorescent light remains. The last factor seems the most important for the explanation of the abnormity in case of the photo-electric measurements.

Four photo-electric measurements have been made on epidermal layers of about .10 to .12 mm. thickness. These were carefully removed after a cantharides blister had formed on a part of the arm where no coarse hair penetrated the epidermis. These layers were kept humid as described above and measured one hour to three days after removal. Three layers gave very uniform results, the average of which is therefore given; the other one showed stronger absorption, although it had the smallest thickness. The curves on Fig. 4 indicate that the

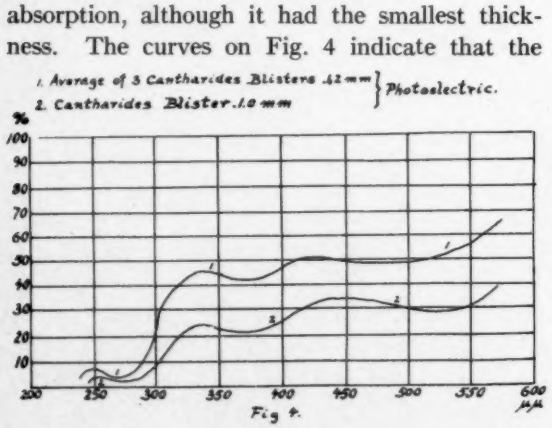


Fig 4.

visible light penetrates these epidermal layers considerably, 25 to 50 per cent. Even the near ultraviolet is transmitted strongly, to about 330$\mu\mu$ where increased absorption sets in, which brings the transmission down to 2 to 5 per cent below 280$\mu\mu$. This is in direct contrast with Hasselbalch's observations, according to which only .01 per cent of the incident radiation of 289$\mu\mu$ penetrates .1 mm. of epidermis. It is more in favor of the results of Schultz and some observations of Macht and his co-workers who noticed traces of light of 280$\mu\mu$ through skin layers of even greater thickness. The penetration increases even in the neighborhood of 250$\mu\mu$ before end absorption sets in. Three photographic measurements have been made on three epidermal layers (one cantharides blister, two Pemphigus blisters) from .16 to .20 mm. Fig. 5 gives results similar to the previous ones. Except the blister of a negro, there is 1 and 2 per cent passing at 253$\mu\mu$.

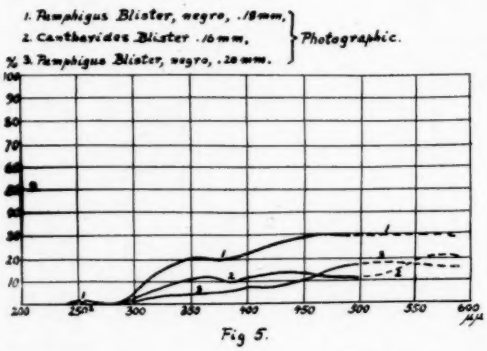


Fig 5.

Three photo-electric measurements were made with epidermal layers from Kromayer, alpine and x-ray blisters, which were dried out from two weeks to two months (Fig. 6). These

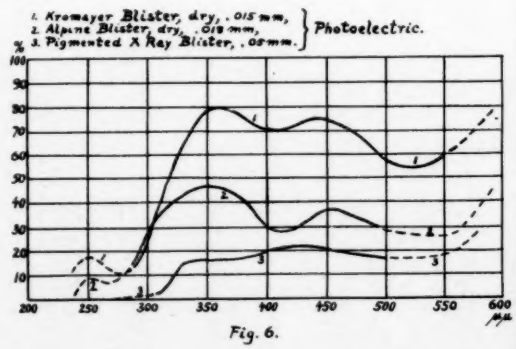


Fig. 6.

layers appear very thin, from .015 to .05 mm. The two thin layers gave similar results as the wet layers mentioned before, with even more penetration in the ultraviolet. The thick x-rayed flap was strongly pigmented. Its transmission fell rapidly to a few per cent at 313$\mu\mu$ and even smaller figures in the far ultraviolet; this seems partly due to the greater thickness, partly to the heavy pigmentation.

Fig. 7 gives the results of photographic measurements of a thin alpine blister of a white woman. Even 10 per cent penetration occurred at 250μμ. It also shows the transmission through a comparatively thick layer from an exfoliative dermatitis. The cut-off is at 300μμ.

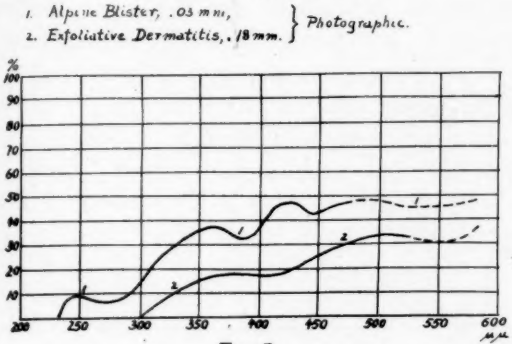


Fig. 7.

The epidermal layers, as considered so far, consist of a horny layer of dead cells and of living cells which are composed of protein and lipoid substances, and other organic and inorganic compounds. It is of prime importance to know what part each of these so different layers contributes to the absorption. As representing the dead horny layer of the epidermis, one section was taken from a corn, one from the horny layer of the sole of the foot, and a skin flap of a case of epidermophytosis from .25 to .4 mm. thickness.

Figure 8 indicates that these horn layers are, however, much more transparent in the near ultraviolet. At 280μμ they exhibit pronounced absorption; at 250 a relative transparency.

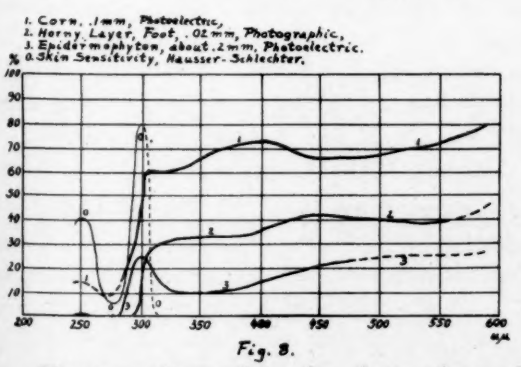


Fig. 8.

These results explain the observations of Hausser and Vahle that the skin sensitivity toward the ultraviolet reaches two maxima: one at about 300μμ and a second at 250μμ. The sensitivity minimum finds its explanation by the increasing absorption of the rays in a layer of dead tissue which is not physiologically affected by the rays. We might call this occurrence a physiologically passive absorption.

As a sample of the living substances in the lower epidermal layers, eight preparations of blister and blood serum were measured. Although the results varied substantially according to the thickness, the concentration, the haemoglobin discoloration of the blood serum, etc., as indicated in Figs. 9 and 10, they all showed a

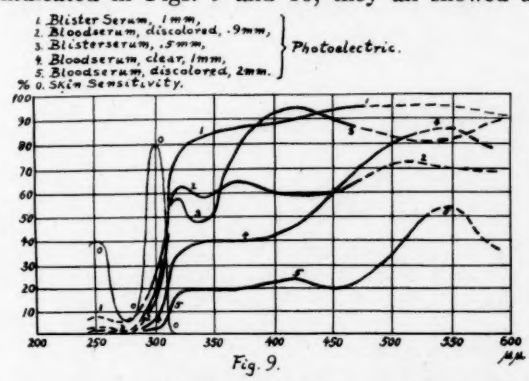


Fig. 9.

pronounced absorption band, starting with 313μμ. Above this limit there exists uniform small absorption; below this limit absorption increases rapidly. This increase of absorption coincides exactly with the longer wave section of the skin sensitivity curve of Hausser and Vahle. It explains the sudden increase of sensitivity from 313μμ on, by the selective protein absorption, which can be called a physiologically active absorption, producing biological reactions in ratio to the absorbed energy.

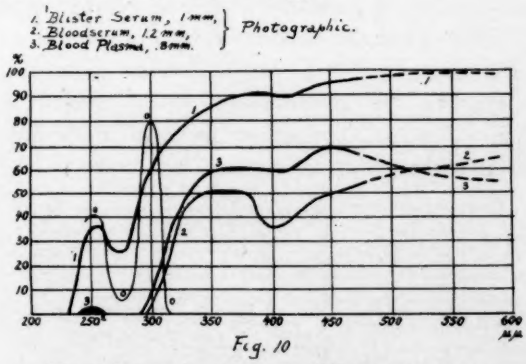


Fig. 10

Our absorption curves of human serum corresponds fairly well with those given for egg albumen and for serum by Henri and his coworkers. Their absorption maximum at 250μμ coincides with ours; the absorption band of egg

albumen starts at 310, but is not so sharply defined as ours; their serum absorption band is sharply defined, but sets in as low as 293$\mu\mu$.

Considered together, the absorption curves of horn, and of the proteins of the blood serum synthetize the absorption curve of the epithelial layers pretty well, and give a full explanation of the sensitivity curve of Hausser and Vahle.

We have also determined the transmission curve for two preparations of melanin, as the most important pigment of the skin. From Fig. 11 one can see that a layer of .01 mm. (dissolved

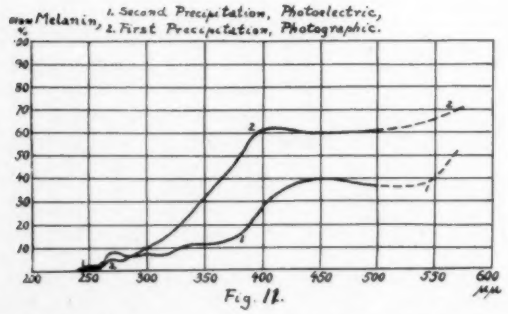


Fig. 11.

in $\frac{n}{20}$ HCl.) transmits the red light very strongly, the rest of the visible light fairly well, the near ultraviolet less, and the far ultraviolet from 260$\mu\mu$ on very little. From these measurements the melanin can be considered as a protective for the basal cells, in particular the nuclei, and partly for the corium against the ultraviolet, especially the far ultraviolet.

Finally a thin layer of earwax, about .2 mm., an ether solution of earwax of the same effective thickness and a solution of lanolin in ether (about 1 mm. lanolin) were measured, resembling the grease layer which covers the skin. Fig. 12 indicates a selective absorption in the near and far ultraviolet, respectively,

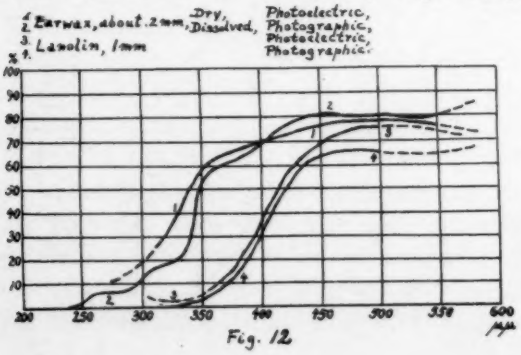


Fig. 12

which is, however, not very pronounced and should not be of much consequence as a passive absorber. The possibility, however, exists that these fats can be activated against rickets by ultraviolet light. In this case the increased ultraviolet absorption would point toward a component which has a pronounced selective ultraviolet absorption and would be responsible for an antirachitic activation as suggested by newer observations by Sonne and Reckling.[22]

In the following experiment we have measured the penetration of light through layers of whole skin and of certain parts of the skin. Two specimens of skin have been measured photoelectrically, one of a white, one of a colored body. The skin was frozen and cut by the microtom to a thickness of .6 (white) and .4 (colored) mm. These specimens (Fig. 13) were quite transparent in the visible and near ultra-

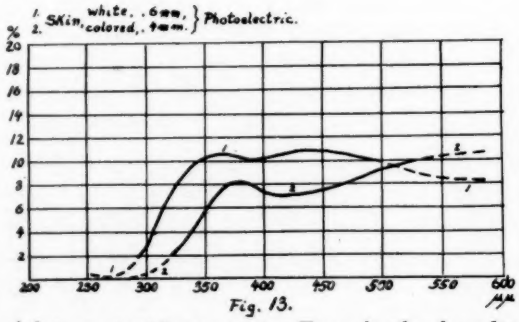


Fig. 13.

violet, up to 10 per cent. Even in the far ultraviolet traces of penetrating light could be detected, and in the case of the white skin even measured, with 2 to 4 per cent. The pigment of the colored skin reduced the transmitted energy nearly to zero in the far ultraviolet. On account of the possibility of fluorescence causing these results a similar specimen of white skin, .37 mm. thick, was measured photographically. The result (Fig. 14) was a much smaller pene-

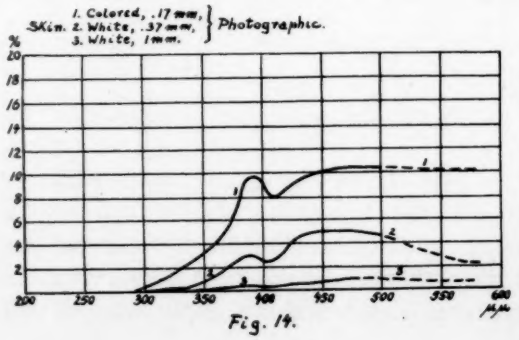


Fig. 14.

tration, and no transmission in the far ultraviolet. Even a much thinner specimen of colored skin did not transmit any far ultraviolet. The transmission of 1 mm. skin, observed photographically, was very small over the whole spectrum. All these curves show a decrease of transmission at 400$\mu\mu$ on account of the blood absorption as determined later.

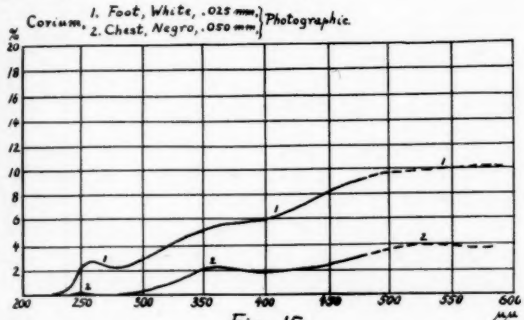


Fig. 15.

We have measured two specimens of the upper part of the corium, close to the papillae, which were also prepared by use of the microtom. Fig. 15 shows the blood absorption at 400 and the protein absorption at 280 and below 250$\mu\mu$. The absorption of these very thin layers of corium was very pronounced. In order to try undisturbed thin layers of connective tissue, we have measured the fascia of two rabbits (omentum), and of human bodies (f. lata). Fig. 16 shows a much greater penetration than

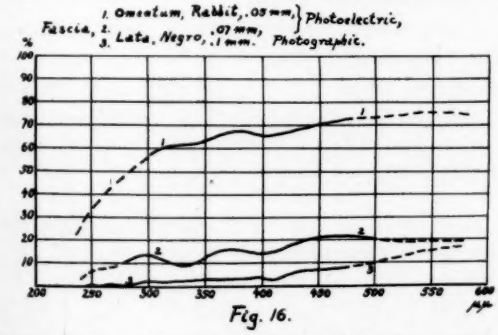


Fig. 16.

that of the corium with very little characteristic absorption. Two very thin layers of subcutaneous tissue have been measured photographically, showing much greater penetration than the corium (Fig. 17) with some selective absorption noticeable.

Fig. 18 gives several transmission curves of human fat layers of various thicknesses, suggesting a gradual increase of absorption toward the far ultraviolet.

Fig. 19 gives the transmission through a muscle layer of .40 mm., with the blood absorption at 400$\mu\mu$ indicated, and no transmission below 300$\mu\mu$.

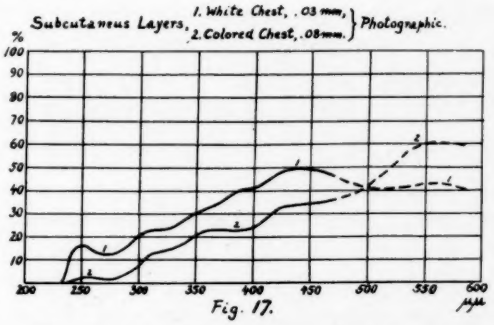


Fig. 17.

Finally, the transmission through a suspension of citrated blood in Ringer's solution was determined for a preparation equivalent to a layer of .03 mm. blood. The absorption is very pronounced at the border between the visible and ultraviolet part of the spectrum, and in the

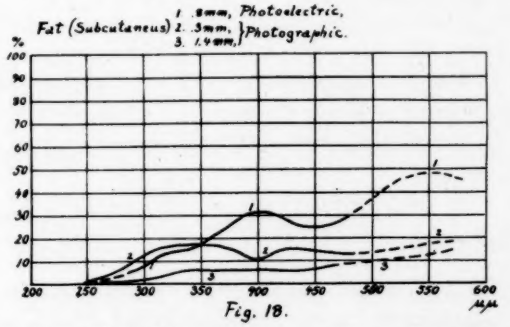


Fig. 18.

far ultraviolet below 280$\mu\mu$. Minor absorption bands occur at 313$\mu\mu$ and in the green parts of the spectrum, as determined previously by other authors.

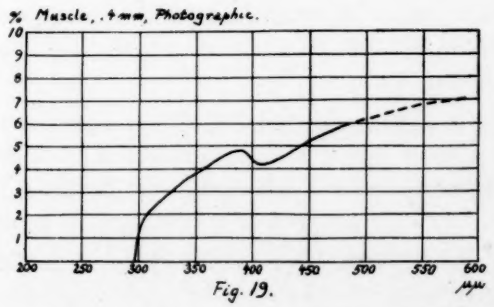


Fig. 19.

From these observations we may draw the practical conclusions that a radiation of more than 400$\mu\mu$ should be used, if pronounced penetration into the corium and into the subdermal layers is required, that the wave length 400$\mu\mu$

is particularly suited to be absorbed in the blood capillaries and to affect the blood stream.

Similarly for the ultraviolet we have to expect that a considerable percentage of the near ultraviolet at 250μμ reach the corium, that 270 to 280μμ are practically all absorbed in the epidermis, and that no radiation shorter than 240μμ reach the living parts of the epidermis, all being absorbed in the dead horny layer of the skin.

The investigations as presented are not yet concluded. We know that more measurements are necessary on biological objects and on chemical substances. Therefore, we do not intend to draw any more conclusions than already given. The preliminary results of these investigations are the following:

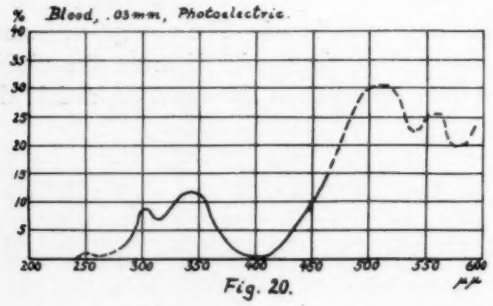


Fig. 20.

1. Quantitative figures derived from exact measurements in a highly purified spectrum.

2. The indication that different methods of measurement give rather different results on account of the different registration of pure absorption, scattering and fluorescence.

3. The proof that the ultraviolet and even the far ultraviolet parts of the spectrum penetrate deeper and stronger than generally accepted, but less than claimed by Macht, Anderson and Bell.

4. The proof that the various layers of the skin exert a very different absorption and show characteristic selective absorption bands.

5. The possibility of a synthetical construction of the skin sensitivity curve (toward erythema production) by the passive and active absorption in the epidermis.

6. A suggestion how deep the various parts of the spectrum enter the skin, and which parts may be useful for practical purposes.

We gladly take this opportunity to express our thanks to Prof. A. P. Carman of the physics department for his interest in the progress of our work, to Prof. H. R. Jaffe for his help in securing and preparing most of the biological specimens, and to Prof. W. H. Welker for the melanin preparations.

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THE CANCER PROBLEM—CRITICAL REVIEW OF THERAPEUTIC METHODS*

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CHICAGO

Much confusion exists regarding the cause, character and therapy of cancer. With scientific workers prematurely announcing etiologic discoveries as facts, with cures being advocated on purely theoretic concepts and with research workers disagreeing with each other, it is no wonder that well-meaning but untrained minds rush into print with wierd and fantastic ideas and definite promises of cure.

Charlatans find the victims of cancer an easy prey, for their nefarious schemes and half-baked concoctions are heavily advertised, even to the profession, by what purports to be scientific literature, and all this in the face of immortal fame and wealth awaiting anyone who can demonstrate a cure of cancer.

In the midst of this chaos the general practitioner and specialist must be the adviser and guide, the teacher and friend of the afflicted, who are only too easily swayed by the printed word or the bold assertions of dubious characters. But to act intelligently we must know how much is true and how much untrue in the mass of etiologic theories and therapeutic methods that have been advocated.

It is essential that we sift the material with critical eyes. We shall, therefore, glance at the earliest periods of medical history, review the more prominent etiologic theories, survey the present day status of the cancer problem and conclude with a brief discussion of the rationale of modern therapy of malignant blastomas.

*Address delivered at the seventh annual meeting, American College of Physical Therapy, Chicago, Oct. 10, 1928.

HISTORY OF CANCER

Doubtless the affliction has been known to a number of the ancient nations, but it was Hippocrates who first carefully observed and described it and coined the name "karkinoma," because, as Galen later tells us, the growth with its adjacent engorged veins resembles the body and legs of a crab. In the German and Slav medical literature the corresponding words of crab ("Krebs" and "rak") are in common use, even though such a designation is really a misnomer.

Galen, whose influence on medicine lasted many centuries, teaches a very simple pathology. The human body consists of solid matter and four humors: blood, mucus, yellow bile and black bile. Disproportion of these humors causes disease. Thickening of the black bile produces cancer, which assumes an ulcerative form if the thickened bile is acrid, otherwise the occult form results.

The great Vesalius was the first to attack Galen's authority by boldly teaching that the ulcerative and occult cancers were one and the

same disease in different stages, but Galen's influence remained unshaken.

Paracelsus taught that cancer results from an excess of mineral content of the blood, but he had no better luck.

It was only in the seventeenth century that Galen's influence began to wane. The discovery of the circulation of the blood, of the red blood corpuscles and of the lymph vessels, exact anatomic knowledge and, through it, the foundation of pathology, were bound to dispel the mystic and fantastic and stimulate naturalizatic research. This is proven by the fact that Descartes and Hunter conceived cancer to be a disease of the lymph vessels.

It is to the eternal glory of France that it was its "Napoleon of Medicine," Bichat, who first discovered the lobular structure of carcinoma and placed the growths in the tissues themselves.

Another distinguished Frenchman, Laennec, of stethoscope fame, was the first to develop Bichat's teaching and to differentiate between homologous and heterologous tumors.

Finally the French pathologist, Cruveilhier, regarded what he termed "cancer juice," a specific part of malignant tissue.

With this brilliant beginning another triumph must be recorded. With the recognition of the character of the cells, a solid foundation is laid for the pathologic classification of tumors by the great German, Johannes Mueller.

The introduction of cellular pathology by Virchow sees the complete overthrow of Galen and with it the historic ends and the modern begins, but, as will be alluded to later, the influence of Hellenic medicine has more than purely historic interest.

ETIOLOGIC THEORIES

Julius Cohnheim was the first to give the scientific world the *embryonal theory* as a working hypothesis. In brief, Cohnheim believed in a congenital disposition, that is, more cells being developed in an early stage of embryonal life than are necessary for the building of individual parts of the human economy.

These displaced cells need only some impulse such as trauma, irritation or even a purely physiologic process accompanied by increased blood supply (puberty, pregnancy) to develop the condition for abnormal growth.

Arguments in support of the embryonal theory are:

(1) Malignancies are encountered in early childhood.

(2) Sarcoma is very often seen in young persons.

(3) In branchiogenous cancer the epithelial cells remain constant during and after the retrogression of the embryonal clefts.

(4) Heredity.

Wilms' study of mixed tumors leads him to elaborate the embryonal theory to the effect that the diverse cells become differentiated only with the development of the tumors, whose structure depends entirely on the character of the embryonal development. This concept he substantiates by implantation of embryonal cells of week-old chicken embryos, which resulted in considerable growth with differentiation of the implanted cells and tissues. Wilms assumes that in malignant tumors the embryonal cells are shunted in the development and remain dormant for the time being. If these cells develop later they have lost every connection with the surrounding tissues and all normal structural relations are lost, resulting in progressive granulation which terminates in malignant tumor formation.

Ribbert realized that Cohnheim's theory was weak and tried to prop it with strong proofs arrived at by elaboration. He, too, emphasizes the separation of cells and cell complexes from their connection. This separation takes place not only during embryonal life, but also postfetally. These cells can granulate post-fetally and those which produce cancer granulate very intensely. The separatioon of the cells is produced by some process of growth characterized by a mixing of different cells. Malignant growths are produced by germinals rich in cells, which are entirely independent of the mother base except as regards their nutrition. Detailed study of Cohnheim's theory shows that its originator accepted that cancer can develop only in

a hyperemic locality where the neighboring cells have lost defensive resistance, but Ribbert sees in the separation of the cells itself the cause of a growth following a period of inactivity. Ribbert sees nothing specific in the malignant character of cancer cells, as all cells can increase and multiply under favorable conditions, the adhesion to the general organism preventing their irregular growth. But when separation does take place the human organism loses control over the cells, much like soldiers of a disciplined army who desert the ranks and run amuck.

Support of Ribbert's hypothesis is sought in transplantation of epidermis in subcutaneous tissue. This resulted in epithelial cysts which were especially pronounced when connective tissue was added to the transplanted epithelium, but all these new formations retrogressed in time. Among the number of experiments which have been performed to substantiate or disprove the embryonal theory, we find some valuable information. Lubarsch found that the behavior of the implanted tissue depends on the conditions for function and nutrition in the area of transplantation, but that higher differentiated tissues perish much faster than lower ones. Ribbert himself maintains that most tissues can be transplanted when nutrition is assured, but is successful only in the same species, the difficulties increasing as we ascend the scale of the vertebrates.

CRITICISM OF THE EMBRYONAL THEORIES

Those of us who studied medicine during the end of the past century will recall the popularity of the embryonal theory. "Look at a teratoma," one of my teachers chastised me when I dared dispute Cohnheim's hypothesis as all-satisfying, "and you have proof conclusive that Cohnheim is right." The eminent pathologist, Edwin Klebs, was once asked by me to explain the etiology of teratoma and he said that such a growth resulted from tissue rudiments which had been "abgekniffen" for which "bitten off" is probably the best translation, and that these rudiments formed the nidus for future growth.

Whatever may be said about a comparison between teratoma even of the autochthonous type and normal growth of cells, one thing is certain: teratomata seldom if at all become malignant.

But we have more convincing causes for rejecting the embryonal theory. If it were correct, why is cancer seen so rarely among primitive tribes? Surely they are as subject to embryonal development as the civilized races.

Samuel and Hauser call attention to the development of cancer in scar tissue following burns. Here we can readily see that if embryonal cells were the underlying cause they would have been destroyed by the burns. The same argument is applicable to the frequently observed development of cancer in ulcers of the stomach.

Albrecht rejects Cohnheim's, Wilms', and Ribberts' teachngs on purely morphologic grounds, for embryonal cells are easily differentiated from those of the adult organism and because in certain cancers the cells show a radical difference from the embryonal type.

Finally the embryonal theory fails to shed light on the all absorbing problem why embryonal cells should become malignant in character.

What may be termed an *embryo-mechanic* theory is advanced by Albrecht, who regards all tumors as organ-like malformations.

In the mechanism in which myriads of cells become more and more complex until they develop into great organic formations according to fixed laws, errors occur in the organic dispositions, in the development of growth of separate areas or in the association of individual cells.

The same principle which retards the organic disposition of the teeth, to cite an example, causes retardation of other dispositions for later development. Thus all cellular theories may be abolished and a pathology of organic formation adopted instead. This is applicable also to malignant tumors, for many of them develop from clinically and morphologically benign growths. In malignant growths as in others, we see organoid growth and activity in differentiating grades. Malignant tumors vary much as regards the time period of development, from very slow to extremely rapid forms while even

benign tumors show a tendency to develop metastases. Rapidity of growth is not an inherent quality, but due to co-development of connective tissue and blood vessels, as is seen in malignant adenoma and especially in malignant hypernephroma. The prototype of epithelial growth is embryonal glandular growth.

Without entering into detailed arguments regarding the positivistic value of Albrecht's ingenious reasoning, he himself misses therein a rational explanation of the malignancy per se. He seeks the explanation in the cells themselves or in the surroundings, for after all, the ability to increase is limited. While there are stimuli which favor growth and multiplication, the power of proliferation ordinarily is restricted—all of which leaves us in statu quo.

Under this grouping we may briefly allude to certain experimental claims by Kelling, who accepts cancer cells as embryonal cells taken into the human economy from without, as by food, the causative cells coming from lower animals.

The whole Kelling proposition can be summarized in one sentence. He claims to have produced fibrosarcoma, adenocarcinoma and mixed sarcoma by vaccinating the wounds of dogs with the mucus of snails. But when these experiments were subjected to check by other observers it was demonstrated that Kelling's so-called new growths were simple reactions following the introduction of foreign bodies. This is not the only time in the experience of cancer research that experimenters have suffered shipwreck when they were convinced they were about to sail into the haven of certainty.

CONSTITUTIONAL THEORIES

Thiersch must be mentioned first among the numerous observers who have advanced the idea that the cause of cancer is to be sought in special conditions of the human economy. Because cancer is seen in the aged, it was believed by Thiersch that the static equilibrium of epithelium and stroma is disturbed. In senility the connective tissue loses its power of resistance, while the epithelium continues to remain active and, being capable of granulation, it gains the upper hand and grows into the connective tissue. The thymus gland illustrates the variation in the life of individual tissues which applies to the aging of connective tissue.

B. Fischer develops a constitutional theory by way of experiment. By injecting oils and fats to which a scarlet red dye has been added into the ears of rabbits, he noted cellular infiltration, formation of giant cells and abundant new formation of young connective tissue while the epithelium sprouted into depth around the oil droplets. Fischer concludes that the dye has a strong chemotactic effect on the epithelium, resulting in the latter growing towards the oil droplets through the connective tissue which is loosened by inflammation. Such chemotactic bodies Fischer named "attraxins."

Another constitutional theory has been advenced by *von Leyden* and *Bergell.* These investigators produced a ferment from the liver of rabbits which, when injected into large inoperable carcinomata and sarcomata produced extensive disintegration of the tissues described as an enzymic necrosis. They reach the conclusion that malignant tumors grow unchecked through the lack of a ferment, hydrolytic force of the organism, which in all probability is specific, though another subordinate factor must be taken into account—the avidity of the cancer cell itself.

In *criticism of the constitutional theories* it is pointed out that Thiersch's concept is not supported by clinical observation. If his theory were correct cancer should grow rapidly in the old on account of the deteriorated connective tissue and by the same reasoning the growth in young individuals should be correspondingly slower. In reality, however, cancers grow rapidly in young individuals and slowly in aged individuals.

Fischer's conception is not substantiated by unprejudiced observers. They see in his dye experiments nothing more nor less than intense inflammation of the connective tissue and moderate epithelial granulation which have little resemblance to malignancy.

The experiments by Leyden and Bergell are highly instructive and contain a seed which should bring forth further substantiation. To

our knowledge later research has not been productive of positive results to explain the etiology of malignancies.

The so-called *cell theories* resemble in certain features the embryonal theories and we can, therefore, restrict ourselves to a very brief sketch of the principal features. The quarrel among the promulgators of this type of theory has centered around the question whether the malignancies are the result of congenital pathologic qualities, or, whether even previously normal cells can undergo biologic changes. Only Marchand makes the more or less concrete assertion that the power of proliferation and the destructive activity of the tumor cells is to be regarded as the toxic effect of their metabolic processes.

The most careful study of the entire available literature on the cellular theories fails to convey any information concerning the cause of the change of the biologic character of the tumor cells, and can therefore be eliminated as a working hypothesis.

The situation is somewhat different when we consider the *theory of irritation.* The question whether an acute trauma, which may be raised in courts of justice, is to be answered with an emphatic NO. There is not one authentic case on record, not even of a sarcoma, the more so of a cancer developing after and directly due to an injury. When it is considered that thousands upon thousands of injuries of a more or less serious character occur daily throughout the world, one has collective material for support or disproof of such an etiologic factor which is more than abundant. This is also substantiated by experiments, all of which had negative results.

A striking example for the theory of chronic irritation is found in the use of pipes by smokers. It is strange that even in this popular idea the question why it is that the lower lip only is affected and why millions of men smoke and reach a ripe old age without any evidence of irritation has never been answered satisfactorily.

By this remark it is not intended to dismiss the theory of irritation as of negative value, for aside from the fact that even Cohnheim resorts to irritation as a secondary factor in the development of cancer, we have the undisputable evidence that certain industrial workers such as chimney sweeps, tar laborers and x-ray technicians are particularly subject to malignancy. The production of cancer in mice through repeated irritation with tar serves to strengthen the concept that there is at least a relation between cancer and chemical or physical irritation.

We know that scars, ulcers and even inflammatory processes may become cancerous and it is explained that ordinarily such conditions show granulation of the epithelium which may assume a malignant form.

Virchow believed that the reason why certain orifices such as the anus, rectum, cervix, lip, cardia, pylorus and the like become cancerous is because they are especially subject to irritation, but it suggests itself that digestion and elimination through the intestinal tract, parturiency, menstruation and in fact all functions of the body are natural and necessary for the welfare of the human economy and accordingly one is at a loss to charge life itself with responsibility for favoring malignancies, nor can we possibly avoid such a source.

But a thorough study of physical and chemical irritation in the narrower sense of the word shows tissue change of a pathologic character, and this may be logically accepted as presenting merely a locus minoris resistentiæ to cancer invasion. As an immediate cause of cancer the theory of irritation in itself has no foundation and is not adapted to explain the etiology of malignant neoplasms.

The theory which periodically has stirred the entire world may properly be referred to as the *infection theory.* The apparent similarity of cancer to tuberculosis and syphilis has suggested the idea that cancer is due to a specific virus or microorganism of some kind.

A mere glance at the history of this theory which has been under scrutiny for about forty years shows many dramatic incidents. Of the older workers, Doyen, a well-known surgeon of Paris, is the only one to claim that cancer is caused by a genuine bacterium, which he named micrococcus neoformans. Doyen not only

claimed to have obtained cultures from human cancer, but to have produced with this culture epithelial granulations in the liver and mamma of guinea pigs. He prepared a serum or antitoxin which he termed "cancroin," and actually treated patients with it. Older practitioners may recall the newspaper notoriety resulting from a law suit in a Paris court, Doyen having demanded an exorbitant fee from an American whose wife he had failed to cure. We shall make no further comment on this nor on the numerous older discoveries of different specific causes of cancer and shall restrict ourselves to a discussion of the most recent claims.

In 1924 Glover published in the Journal of Cancer (Dublin) an article claiming to have isolated a microorganism from human cancer. The same claim appeared about a year later in Surgery, Gynecology and Obstetrics by Nuzum, who has devoted a number of years to this kind of research. Ochsner supported Nuzum's claim, but he admitted that repeated injections were necessary to produce a tumor at a selected site. Checks by competent observers have shown that such injections produced merely inflammatory reactions.

In the early summer of 1925 the civilized world was electrified by the announcement that Gye and Barnard had definitely solved the cancer enigma and discovered the real cancer virus or germ. The press leaned on the authority of the editorial department of the British Lancet. This discovery was said not only to fulfill all the scientific demands for proof, but the actual responsible organism, a filtrable virus, had been photographed by special appliances.

It is sad, indeed, to relate that soon after this announcement several workers came out with the statement that they had always contended that the infection theory was the right one for the palpable purpose of securing some glory and material support for themselves.

Only a little more than three years have elapsed since mankind was given a new hope, but today an ominous silence reigns where before was loud cheering and jubilation.

As in all likelihood we shall hear of similar claims in the not too distant future, we will show by the very proofs Gye and Barnard have submitted that the infection theory is erroneous.

Bacteriology has advanced so far that it may be regarded as an exact science. If someone should desire proof that the gonococcus is responsible for a specific form of arthritis one can establish the guilt of the coccus beyond doubt. Any of the acknowledged methods utilized for the test leaves no room for criticism or doubt.

Now as practitioners of medicine and surgery we do not claim to be scientific laboratory workers in bacteriology and pathology, but we have the absolute right to demand that if a laboratory worker claims to have isolated an organism which is the immediate cause of an infectious disease, that laboratory worker must satisfy our demand for standard tests to confirm his claim. The argument that in cancer conditions are somewhat different, necessitating modified methods of proof, is not acceptable in principle. Either a germ, no matter of what kind or character, is the cause of cancer, and then it must be demonstrated by definite bacteriologic laws, or else there is no such microscopic cause and substantiation is superfluous.

How do Gye and Barnard substantiate their astounding claim?

First, chloroform and acriflavin suspend the virulence of the tumor filtrate; secondly, greatly attenuated subcultures on nutrient media still remain virulent; and thirdly, Barnard has photographically demonstrated "spheroids" which resemble those observed in pleuro-pneumonia.

How do these "proofs" stand the light of critical analysis?

The eminent cancer worker, Professor Teutschlaender of Heidelberg, has shown as early as 1923 that the addition of chloroform to a tumor emulsion used for the experimental investigation of the biology of an inoculable chicken tumor, does not suspend the virulence of the emulsion. A year after Gye and Barnard had published the labor, Flu, and another year later, Ernst Frankel, had shown beyond doubt that the tumor extracts retain activity ofter the addition of chloroform, Gye himself admitted that the antiseptic effect of acriflavin is uncertain. But

admitting for the sake of argument that chloroform or acriflavin do inhibit virulence, such an effect is established also on cells or cell products. The effect of chloroform or an antiseptic is proof of the kind which has been dubbed "post hoc ergo propter hoc," or plainly speaking, no proof at all.

Gye and Barnard's second proof at first blush appears formidable, but on close scrutiny it, too, fails. Gye has used embryo cells of chickens for his experiments. If his cultures are to be accepted, then we must be satisfied that these cultures are absolutely cell free. As the great labors of Carrel, White, Albert, Fischer, Laser and others have unquestionably shown that the inoculable Rous tumors are active through a chemical substance and not through a micro-organism, and as Gye and Barnard's labors are merely an advance of Peyton Rous' researches we have no proof that the cultures are not free from cells which may have multiplied in the sense of original malignity or through a ferment.

Finally, and this has been specially stressed by the editor of the British Lancet, the similarity of the spheroids to those of pleuropneumonia is to be accepted as strong proof. That would be acceptable, provided they stood the bacteriologic tests we workers in the field accept as definite. Gye and Barnard themselves, however, testify that if they could cultivate a single virus cell and produce a tumor by injection the proof would be incontestable. But to date, neither Gye and Barnard nor any one else has been able to produce such a culture. Nor will anyone ever do so for the simple reason that there is no specific microorganism to discover. The infection theory has no foundation in fact and can be considered definitely disposed of.

THE CANCER PROBLEM TODAY

For thirty-four years I have labored clinically with cancer problems and have eagerly followed the laboratory worker, animated by the hope that some day I would be able to put the scalpel aside and give the sufferers a therapy which would lessen the heartaches which every surgeon must experience on many occasions.

Because that hope has not yet been realized, experimental research has been decried as jejune. This is a destructive criticism which is only too readily gathered by fanatics or charlatans for their own purposes. The tremendous labors, let it be clearly understood, have not been in vain and the criticisms of the theories we have just submitted are made in a spirit of respect which every clinician gladly pays to pathfinders. Indeed, even the thorough investigation of a false theory means a decided scientific achievement, since it eliminates a false road for all times to come and thereby narrows down the number of paths which must yet be explored before the right one leading to the desired goal can be found.

This remark applies also to the historic sketch of Hellenic medicine. Even though in the Hippocratic era we still find fantastic and superstitious ideas, the true historian will detect an earnest effort to free medicine from the temple and to direct it along naturalistic paths of investigation. We have no right to sneer at such a beginning, since we ourselves live in an era of so-called civilization which is honeycombed by weird cults with the overwhelming majority of men and women still looking upon disease as a supermundanely ordained scourge, which calls for supplication as a therapeutic measure.

We ourselves stand in awe before the enigma of cancer, but accept birth, life and death as perfectly natural phenomena with philosophic concepts of biology playing only roles of academic interest. Yet in the study of cancer we must extend our investigations beyond the individual. We have already rejected the embryonal theory because it is inapplicable to primitive tribes, but we have no answer to the question why cancer is a disease of civilization.

When we study the available collective statistics we note that the Swiss and the Scandinavians have a far greater morbidity rate than the other peoples in Europe and North America and we immediately seek a cause in the soil, mode of living and the like. But these factors must be eliminated since there is no perceptible difference anywhere. We know, however, that the Swiss and the Scandinavians are racially purest and the question suggests itself whether such a racial characteristic is not responsible

for a lessened resistance to malignant disease. Here we have problems which should interest the physician as well as the ethnologist.

Reverting to our subject proper we know today that the blastoma problem is a problem of growth and that in cancer it is not a question of increased but of malignant growth, representing a biologic problem of the cancer cell itself. We know that the malignity is based on metabolic disturbances emanating from the cells, due to altered fermentative characteristics. Lessening of the surface tension, disturbance of the equilibrium of the ions and in all probability diminution of the calcium content, aid in infiltration, growth and metastatic development. Otto Warburg's teaching that the cancer cell itself creates lactic acid as a medium needed for its growth shows the trend and result of profound investigations in the field of biochemistry. Be all that clinically inapplicable as yet, we have at least a solid foundation for we are no longer going to seek the cause of cancer without, but in the cell itself, because in its altered metabolism will be found the cause of malignancy. Even though histology leaves us in the lurch so that it is morphologically scarcely possible to differentiate between a normal and a cancer cell, we at least know that there is a distinct biologic difference and that we must seek its revelation in the test tube and not under the microscope.

True, the solution is not yet presented concretely, but it will come as such in the very near future, not as an accidental discovery but as a simple proposition in biochemistry which will fill us with wonder that it has taken so much time to find the right road which was nearer than we estimated. We repeat in conclusion that there is no universal specific cause of cancer and that our problem is biochemic in character and biologic in scope.

THE THERAPY OF CANCER

In the light of what has been said regarding the character of cancer, its beginning as a localized disease can no longer be doubted, and the therapeutic problem, for the present at least, narrows itself down to the problem of ridding the altruistic cells, that is the normal cells which are disciplined and function with and for the human economy, from the egotistic cells, that is the abnormal cells, which show no allegiance but decided hostility.

The inevitable progress of this hostility dictates the need for nipping it in the bud. It follows that the principal therapeutic problem is not only the therapy itself, but the correct diagnosis at the earliest possible moment. Co-operation on the part of the sufferers being of prime importance, tribute must be paid to agencies and individuals who have labored for a number of years to educate the public to seek competent medical aid at the least suspicion of something being wrong. The American Society for the Control of Cancer, the Gorgas Memorial Institute, and a number of medical societies have not only sent out enormous quantities of popular literature on cancer, but many lectures have been given from time to time through the aid of social agencies so that the outlook of seeing malignancies at an early period of the disease is now better than in the past.

The diagnosis in cases of so-called malignancies of an accessible character offers no great difficulties, but the situation is rather complicated in cancer of organs which are hidden from view.

We cannot blame a general practitioner for failing to recognize a case of cancer of the pylorus, to use one of many examples, when the concerned patient presents nothing more than mild digestive disturbance, but we do blame him when he dismisses such a patient with a prescription and dietary advice on the assumption that there is very little the matter. Nine out of ten times such an assumption is correct, but the tenth patient may not feel better, seek another physician or still others until finally a thorough investigation is made and the true character of the malady is recognized. Then help usually comes too late.

It would appear that in the economic conditions we confront, only the very rich or the very poor secure the benefit of our diagnostic armamentarium at the proper time. The rich can afford to undergo tests of the gastric contents, feces, blood, and a series of radiograms at the least indication. The poor man seeking

aid in modern charity institutions will receive the same exhaustive service, but the overwhelming majority of wage earners or small trades people, the struggling professional men and artists present an economic problem which must be solved in every instance in some manner. In our opinion the general practitioner or even specialist must reverse the American juridicial principle and declare every doubtful affection guilty of being malignant unless positively proven innocent. It is true that by adopting such a principle we will remove many a growth which is not malignant at all and we will even perform laparotomies which will prove unnecessary, thus inviting rather unpleasant criticism by certain so-called colleagues, but I would rather carry the stigma of diagnostic incompetence at the hands of such irresponsibles than risk a human life. Lest I be misunderstood I emphasize that I have for years decried the furor operativus, but there are times when an exploratory laparotomy is justified as a diagnostic ultimum refugium.

Perhaps the future will see the development of diagnostic methods which will make this unnecessary, but today we must face reality.

Among the therapeutic methods or measures that have been tried are arsenical pastes, sera and antitoxins that have now passed into oblivion or are still resorted to by charlatans. The physician should know about them only to be able to caution against them as ineffective and therefore dangerous procedures.

The only method that has stood the test of time is classic surgery. In the light of recent biochemic research it is based on a sound, scienttific principle. Used early and in connection with radiotherapy it is the only method which guarantees cure in the fullest sense of the word.

But there is surgery and surgery. The radical excision of an external growth involves no particular technical difficulties, provided one is familiar with antisepsis and hemostasis and is on guard against anatomic pitfalls, but even in external areas complicated problems may arise which must be solved before the operation is undertaken. Let us not forget that radical surgery is not synonymous with mutilating surgery. After all, mere excision is a simple matter provided function will not be interfered with, but a competent surgeon will always plan to make plastic surgery possible to repair defects.

The surgical treatment of the viscera requires special technical skill and judgment. Taking the stomach again as an illustration, the question of resection is one that varies in every instance. We have never performed complete gastrectomy for cancer of the cardia, in spite of the allurement of Schlatter's wonderful feat. In advanced cases the literature speaks of gastro-enterostomy as an operation which will insure relative comfort at least for a while, but as a matter of fact gastro-enterostomized patients continue to lead a miserable existence and we have abandoned it. At the best we have been able to palliate somewhat by a simple jejunostomy. The operation for cancer of the rectum, usually recognized only when already advanced, requires more than a colostomy and extirpation, and only experience can guide us to choose the proper methods. The Mikulicz operation for cancer of the sigmoid is generally recognized as the best, but the procedures involved subject the patients to repeated interventions which are painful and demoralizing. Here, too, there is room for improvement. Cancer of the bladder has taxed the skill of the most expert urologic surgeons in their attempt to bring about ureteral outlets approximating physiologic conditions.

But aside from these and many other technical difficulties there always looms the bugbear of recurrence, so much so that it has been charged that the very scalpel which one was certain went through normal tissue only directly inoculated the dissected area with malignant cells. It was this fact which caused a number of surgeons to resort to the actual cautery not in the sense of destroying tissue as much as to kill all malignant cells in the path of dissection. The use of even the best constructed galvanocautery or Paquelin is not free from certain shortcomings. The dissection must necessarily be a crude one, the heat effect is not well controlled and finally the instruments are hot and clumsy, interfering with refinement of technic. The fumes created by the actual cautery obscure the terrain, which is particularly objectionable when one has to operate in cavities.

A pronounced advance is afforded in the high frequency current, be that by electrocoagulation or electrodesiccation or both. Here we have an instrument which somewhat combines the advantages of the scalpel and the cautery without possessing the disadvantages of either, at least not markedly.

As it would be like carrying coals to Newcastle to addres you with details on an energy which you have made the subject of special study, I shall merely point out that with the so-called cutting current we have a means of dissecting more delicately and more precisely than can be attained with the cautery, since the instrument is less bulky and cold, while the heat created within the tissues actually destroys cells and the area of attack is virtually always under the control of the surgeon's eye. Whether one uses electrocoagulation, which is a rather slow process, or electrodesiccation, which is almost as rapid as the classic method, must be left to the judgment of the individual surgeon, since in accessible cancers there are occasions when electrocoagulation is perhaps the method that promises better results.

Certainly either method frees the surgeon from the charge of having artificially inoculated adjacent tissues and when a recurrence does occur we may well ponder the problem of another independent attack.

I would consider myself remiss were I not to sound a note of warning in connection with the use of the high frequency current as a surgical procedure in malignancy. The idea has been widespread that electrocoagulation and electrodesiccation produce no shock or hemorrhage and that the destructive effect of the heat renders exactness in procedure not quite as imperative as in classic surgery. The result of such a propaganda has been the belief that the mere possession of a suitable diathermy apparatus at once transforms any practitioner into a surgeon. Nothing can be farther from the truth. The fact is that while shock and hemorrhage are greatly lessened they are not eliminated, and skill and judgment are as necessary when we divide tissues with the current as when we employ the scalpel.

Since the discovery of the roentgen rays, we have obtained an energy which has been used with varying effect on malignant tissues and even benign blastomas. Our hopes that the x-rays may prove an effective substitute for surgery certainly have not been realized. It was then proposed to obtain deep effects and the reports from certain enthusiastic workers have caused countless hospitals to make costly installations. Today these appliances are for sale because they are no longer in use. Try as the technicians might to control and measure the dosage, the rays proved a double edged sword, destroying the altruistic with the egotistic cells, so much so that the question arises whether there is any indications for the x-rays at all and whether we would not be better off if we would strike them off the list of our therapeutic agencies in malignancies, except as a purely palliative measure.

It is different somewhat with radium, for this radio-active metal has, properly applied, a definite though morphologically as yet undemonstrated effect on malignant cells. It is an idle speculation for us to ask in what manner radium affects malignant cells, and we must fall back on clinical observation as a criterion. While it is true that radium alone can cure and has cured a number of external cancers we are reluctant to consider it as a separate therapeutic entity, but prefer to regard it as an adjuvant to surgery which may be applied pre- as well as post-operatively.

When surgery is inapplicable radium becomes a sovereign remedy. Radium, too, has certain disadvantages. The cost represents a serious economic problem. Then its application requires specialistic knowledge requiring thorough familiarity not only with the cancer problems and cancer pathology, but with physics as well. Co-operation between the surgeon and radiotherapist is, therefore, of paramount importance.

In this connection it will be recalled that Blair Bell of Scotland has reported a number of clinical successes by the injection of colloidal lead. Recently German and French observers have selected a number of patients on whom they tried this method. The results have proven anything but satisfactory. Indeed in one instance the result following an injection has proven well nigh disastrous. But it must

be recalled, as one of the observers candidly admits, that there may be a difference between the colloidal lead used by Bell and that which was employed on the continent.

Without clinical experience we are, of course, in no position to pass an opinion on the actual merits of the lead treatment. If further experience should substantiate Blair Bell's claims we must seek an explanation in radioactive properties of colloidal lead.

With the germ theory of cancer disposed of, any treatment with any form of sera or antitoxins is irrational, as has already been alluded to. But some remark must be made about the injection of the mixed toxins of erysipelas and of Bacillus prodigiosus, which was introduced a number of years ago by William B. Coley of New York. Coley and others have seen definite palliative effect in undoubted cases of malignancy which were inoperable, but while some changes have been noticed the method has fallen into disuse because we have even in this type of cases more potent agencies. Whether or no the injection of the toxins created artificial fever and fever has an inhibiting effect on cancer cells, remains an open question since a number of reported spontaneous cures following some disease accompanied by a sharp rise of body temperature have not been scientifically substantiated.

For the sake of rounding out this address we mention the administration of thyroid gland, the ligature of blood vessels supplying affected areas, the injection of alcohol, of liquid air, and finally the treatment of cancer originally advocated by Morton and employed and developed by Massey, namely by cataphoresis, which have been tried for a while, have had their day and have passed into history.

More recently we have seen the theory strongly and persistently advocated by a representative of a cancer organization in England which seems to take issue with the conservative attitude of the Imperial Cancer Research Fund. At first some articles appeared in American medical journals with local followings, but lately the press has been resorted to for polemics culminating in popular monographs. Briefly the idea is that the colon is the breeding place of cancer and the whole cancer problem resolves into one of autointoxication of intestinal origin. Cleanliness of the colon and a lacto-vegetarian diet are the pillars of therapy which are certain to result in cure. It is indeed a cheering thought that a good nurse with an enema syringe can accomplish more than all the eminent scientists of the past and present centuries. How strong the faith of the advocate of this "treatment" is, can be seen when we read further that hot, dry air and chemicals are injected or forced against the growth and thyroid extract is administered, presumably to do something to earn a fee and to keep the patients from treating themselves according to the dictates of the publication.

Educated men, excellent writers on general scientific subjects who have graduated in medicine from the university of the Encyclopedia Britannica, have lately given us well-meant but uncritical books written solely to prevent cancer and to cure cancer. In one instance the work has all the ear marks of laborious research and a favorable introduction by a prominent surgeon who, too, looks upon the colon with grave suspicion. All this would be amusing if it were not so sad.

May I conclude by expressing my appreciation of the opportunity you have afforded me to address you. It is meet that at a congress like this, dealing as it does with the energetics in medicine, the cancer problem should receive a share of your earnest scientific and clinical attention.

THE PHILOSOPHY OF PHYSICAL THERAPY*

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If we investigate the etymology of the word philosophy, we find that it means the love of wisdom, as leading to the search for it; hence the resulting knowledge of general principles, elements, powers, or causes, and laws—as explaining facts and existences. Plato says in his "Republic:" "But who are the true philosophers? Those, I say, who are lovers of the vision of truth." Philosophy, therefore, is the science of rational principles. One essayist on philosophy says: "It is the product of human thought, acting upon the data given by the world without, or the world within, and eliciting from these data principles, laws and systems." Bacon says: "It is true that a little philosphy inclineth men's mind to atheism, but depth of philosophy bringeth men's minds about to religion." Philosophy is the all embracing system that furnishes the ultimate rational explanation of all things; thus the sciences find their only complete explanation in philosophy.

If physical therapy is a science, as we believe it is, it seems appropriate, therefore, that we consider its philosophy, so that we may have reason for "the faith that is within us." Blind adherents to physical therapy may, indeed, have faith without reason; and we are told that "faith without works is dead." Practice should therefore be combined with a philosophical conception of nature and her laws. All therapy has as its end rational co-operation with nature and nature's laws of healing. Heat and light, for example, we know to be necessary for life and body metabolism. The chemical changes and physiological processes constantly and rapidly manifesting themselves in every bodily organ seem to require a considerable degree of heat, which in the human body in health seems to be about 98.6 degrees. Any reduction or increase of this constant and relatively high temperature is indicative of disturbance more or less profound. Disturbances of an acute infectious origin lead to accelerated circulation, an accompanying rise in body temperature and a general increase in oxidation and other tissue changes. Since many forms of bacteria are inhibited or destroyed by heat, fever seems a method on the part of nature to overcome infection, to hasten the circulation of the blood with its antibodies, and to produce a higher temperature in order that infectious material may be more speedily eliminated, and bacterial invasion lessened or destroyed. No organ of the body can function without a considerable amount of heat. If this heat is removed by any means, muscles become stiff and weakened, nerves are deadened, sensation abolished, circulation becomes sluggish, and function generally is so seriously impaired that death may supervene. A subnormal temperature is always the cause for alarm. The living body *must* be warm. Absence of heat means death.

Man has so adjusted himself to *light* that in the present stage of his evolution, it is essential to his existence. His food is manufactured by nature's processes, in the presence of sunshine. Without light, vegetation, as well as animal life, would be an impossibility. It is apparent that certain vitamines necessary for human existence are actually manufactured by the actinic and chemical processes of the sunlight. It has been found, moreover, that the artificial irradiation of foodstuffs with ultraviolet light so activates them, that they gain the very vitamines in which they have been previously deficient. The theory has been advanced that the codfish stores up these vitamines in its liver as a result of feeding on certain forms of seaweeds and plants during certain seasons. These vegetable growths, and the animal growth, plankton, being near the surface of the sea water, are abundantly bathed in sunlight.

Heat and light, in adequate amount, are producers of comfort, not only of body, but of mind, as well. The absence of light, even for brief periods, brings about depression of body and gloom of mind. Mental cheer and a sense of well-being are well known products of an opti-

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mum degree of light and heat. We are all familiar with the comforting and sedative effects of heat in painful and inflammatory conditions. Muscular spasm, an accompaniment of so many inflamed and traumatic conditions, relaxes under the continuous application of the various forms of heat used in physical therapy. Circulation is increased and equalized throughout the body. Lymphatics are opened up for renewed action in disposing of waste products; convalescence from many disease conditions is hastened by the beneficent action of heat. There seems a philosophy, therefore, in the use of these agents in physical therapy. Ninety per cent of our treatment, no doubt, utilizes the powerful and natural agencies of heat and light as methods of assisting nature in her processes of healing. The method we use seems altogether natural; more, it is philosophical.

Doctor de Courmelle of Paris has recently said, in regard to foodstuffs influenced by light, that "we look to the husks of grains of wheat, and the covering of many vegetables which have been well irradiated, to preserve the germinal power and to nourish and enable us to avoid disease. The theory of whole wheat bread is well known. It is the husk, even eaten separately and alone in some cases, which cures disease produced by its absence, as do rice husks in cases of beri-beri—husks irradiated or vitaminized by the sun. A diet composed excessively of decorticated wheat, corn and rice is known to be causative of scurvy, pellagra, and other deficiency diseases. Consequently, some recent investigation has been made which leads to the advice that we consume certain leaves and peelings, substances usually refused. To discard the external portion of vegetables, plants and fruits, is not this a serious mistake? According to Guelpa, these parts of the plant contain abundant calcium, and diet deficient in calcium predisposes to arthritis, or increases it, and we are nearly all arthritic, are we not? The existence of calcium in irradiated foods is normal. Calcium and phosphorus in living bodies which form the skeleton, are strictly dependent on light; with plants this is explained by the absence of chlorophyl in darkness, and the delicacy and inadequacy of the rootlets sent out in the absence of light. In the phenomena of development and vitamine production, it is chiefly, almost exclusively, the ultraviolet rays which are effective. It is these rays which, acting upon living beings, upon irradiated organs, (the liver, for example) upon the liquid fat and the milk in their natural repositories, endow them with the power of destroying germ and counteracting rickets. Physioradiochemistry, heliochemistry thus comes into being, and affords an explanation of many medical problems."

It seems that nature intended that man's life should be one of vigorous activity. The body organs were made to be used and exercised; and health, at its best, is quite dependent upon the proper amount of muscular exercise. This fact, familiar to us all, is nevertheless strangely neglected. In consequence, there are many ailments and disorders directly attributable to a lack of exercise. Muscles become soft, flabby and atrophied from disuse, and fatty tissue is apt to become infiltrated within the muscular fibers, causing inefficiency and often disaster. Exercise not only hardens the muscle, but increases the toughness of the sarcolemma. In fact, as a result of exercise, all of the tissues become firmer and more resistant. They are more able to withstand strains, contusions and ruptures. In addition, the neurolemma, covering the nerves as they pass through the muscles, becomes thicker and more resistant. Thus as a result of proper and habitual muscular function, the nerves are actually padded, which makes them less sensitive to the friction caused by muscular contraction. Habituated to exercise, one takes it with greater ease. The use of the muscles may become actually comfortable, and in the well-trained man there is experienced a real "muscle hunger." It is really a normal sensation, and always shows itself in children, whose almost constant and persistent activity is an indication of nature's attempt to ripen and strengthen the bodily organs. By no other means can development of body as well as of mind be attained by the growing child. We are completely justified, therefore, in using the term "physical education," because it is really education of the highest sort. Present day civilization works havoc with man's muscles. Now he works with machinery, and while he accomplishes infinitely more, he not only loses the physiological values

of muscular exercise, but greatly adds to the strain on his nervous system. Thus, it is to be feared, the candle is being burned at both ends. Physical disaster may therefore be forthcoming to the race. All civilizations have had their rise and fall. If muscular activity is less and less required of mankind, and the strain on his nervous mechanism is continually increased, may it not be that with the swift pace of modern day life, the way will be led to racial and national disaster? We must remember that there is "no wealth but health," and the accumulation of dollars does not always mean the accumulation of real wealth or happiness. If, in the gaining of money, physical health is sacrificed, what does it avail?

Physical therapy should take large account of exercise as a remedial measure. This form of therapy is greatly neglected by most physicians. The prescription of exercise may be as accurately adjusted and as beneficially administered as a dose of magnesium sulphate. Massage, in its varied forms, is really a form of passive exercise, producing, as we know, beneficial results in many cases. We may thereby increase circulation in a given part, sedate an aching muscle or nerve, stimulate the flow of lymph, increase heat, blood flow, and nutrition in a paralyzed muscle, and accomplish all these results without any expenditure of nervous energy on the part of the patient who is being treated. It is our sheet anchor in infantile paralysis. Here, lack of circulation and inability to innervate muscle leads to speedy atrophy. Persistent massage and the application of heat wards off this condition to a great extent; and after a certain lapse of time, perchance the disordered nerve may be restored to function, partially at least. When this occurs, the convalescing nerve will find more vigorous muscular tissue to act upon, because massage has helped in the upkeep of muscular nourishment.

Moderate exercise of the joints in sprains and other traumatic injuries is of assistance in the prevention of ankylosis. In fractures, likewise, when the callus formation is satisfactorily progressing, mild muscular movements should be attempted, so that function may be restored along with the healing of the bone. Convalescence may thus be much shortened.

Exercise is a rational measure, neglected by many of us in our prescriptions to our patients. The writer recalls a professor of physiology, who, after a gall-bladder operation, practiced while in bed a series of exercises of the abdominal, pelvic and other muscles, on his own initiative. His convalescence was so speedy and satisfactory that the surgeon was surprised at his patient's rapid postoperative recovery. He was later told by the patient of the surreptitious exercises which he had made use of. The surgeon remarked that he would never have thought of prescribing such a measure, but that his eyes were opened to the value of this physiotherapeutic method. There is a bit of philosophy in properly prescribed exercise. Another case may be cited of a convalescent case of typhoid fever. The patient was given a body massage, thoroughly applied, daily. The rapid gain in weight and strength seemed directly attributable to the passive exercise of many muscle groups, and this was accomplished without undue strain on the patient's heart and nervous system.

Health depends much on mental emotions; it seems that this fact is being more acutely realized than ever before in the history of medicine. Disease may be aggravated, or even distinctly produced by the emotions of fear, apprehension, worry and similar psychic manifestations. The ancient writer who ventured the assertion that "a glad heart doeth good like medicine," was very modern in his conception of psychology; he might even have said that it was vastly superior to most medicine. The wholesome effects of cheer, hope, optimism, courage, and other exhilarating emotions are marvelous in their healing power. If the physician himself possesses these characteristics, fortunate indeed are his patients; if he can instill these psychic emotions into men and women whom he treats (especially the women), he is indeed a philosopher, and certainly a good psychotherapist.

Marcus Aurelius, who died A. D. 21, was a wonderful philosopher, and has left us some gems for our thought. A few may be quoted here in conclusion which seem especially applicable to the question in hand: "Would you have philosophy? You should always be ready to act on these two rules: first, to do only that

which reason, your king and lawgiver, suggests for the good of mankind; second, to change your course at once if one is able to correct you and change your views. Aesculapius has prescribed for one riding, or the cold bath or walking barefooted; and each is advised according to his need. So for yourself, be philosophical; keep yourself simple, good, upright, unostentatious, affectionate, and steadfast in duty. Strive to remain what philosophy wishes you to be. Reverence the gods; rescue men. Life is short, and the sole fruit of it is purity of heart and kind actions."

DISCUSSION

DR. GEORGE B. LAKE (Chicago): Science deals with the phenomena of the physical universe and asks, "How?" Philosophy deals with noumena or causes—the *life* within the material forms, which initiates and regulates their activities—and asks "Why?"

Years ago, elementary biology, physics and like studies were classed as "natural philosophy," largely perhaps, because we had so little knowledge of the details of the phenomena being studied that we must content ourselves with speculations. Only in this older sense is Dr. Elsom's paper philosophic. Practically all of his suggestions are based upon physiology, which is now considered a science.

We can, however, carry his line of thought to a point where it touches philosophy. First the *life;* later the structure and function, developing to meet the needs of the life. We do not walk because we happen to have muscles; but we have muscles because, millenia ago, the evolving life felt a pressing need for means of locomotion and organs were very gradually developed and perfected to meet that need.

Structures and functions, once developed, are retained and enlarged only by exercise. This is philosophy, because it is observed as a law in all of the sciences, the "why" going back to the life's efforts, just mentioned.

Whence all the energy on this earth? It all comes, directly or indirectly, from the sun. Not so long ago, cosmically speaking, all the light and heat available were contained in the sun's rays. The progenitors of man obtained energy by basking in the sun and by eating the plants upon which the sun had shone or the animals that had eaten the plants.

Material civilization has been the process of, as it were, *canning* the sun's energy, in one way or another, so as to regulate and distribute it more equally in time and space.

Because man has developed all his anatomic structures and physiologic functions in obedience to the laws of solar radiation, physical therapy is philosophic only when it deliberately plans the employment of the agencies at its command so as to duplicate or re-enforce the effects of the sun's energy, in one way or another. The primal nature of life and the omnipotence of the sun must always be kept in the front of consciousness, if we would call ourselves natural philosophers. In five minutes one can do little more than indicate the possible directions of fruitful thought in this field.

Dr. Elsom's suggestions are helpful and practical and his arguments are sound, even if they do not go deep enough to be properly considered as the philosophy of physical therapy.

DR. J. W. TORBETT (Marlin, Texas): I appreciate the philosophy and the correlation of all the different ideas that every physician should use, as presented by Dr. Elsom in his splendid paper. I could only emphasize one thing which I have put into practice and which has been rather widely circulated by Dr. Martin last year in the form of a daily program for biological living to keep physically fit. I wrote this up several years ago after I had cured myself of an irregular heart action and constipation, for which I had consulted Dr. Barker at Johns Hopkins, and other notable physicians. It was entirely due to the fact that I was eating wrong, scarcely exercising, and the strenuous life I was leading. I adopted a bed exercise gotten up by Sandford Bennett, and so simplified the exercises that anyone can use them every morning in bed on awakening. After I got well I told Dr. Barker what it was that cured me. Two years ago Dr. Barker of Johns Hopkins told me he used them himself every morning when he wakened.

The exercises are very simple, and, as the Doctor said, in geting well after an operation, I believe from gall-bladder trouble, he took those exercises in bed. We have all of our surgical cases take the deep abdominal breathing exercises following operations, unless they have a pus case. It prevents adhesions. They will not hurt themselves. It is very easily done, stretching and tensing all the muscles of the body at the same time, then moving them in every direction possible, then taking deep abdominal breathing exercises, bringing the abdomen in and out, lying flat on your back in bed. When you have received the effect of the horizontal position in drawing the blood out of the abdominal viscera and relieving the passive congestion that is so often present, that exercise alone, with regular habits, will frequently overcome constipation, with the proper diet. I think it is better than a lot of sinusoidal treatments without the exercise and diet combined.

DR. J. C. ELSOM (Closing): I was not very particular about what I said in this paper, because I knew that George Lake was going to discuss it afterward, and anything that I left out, that learned and wise man would certainly put in. He has done it. As a matter of fact, he has not said anything at all except what I said in the first place.

I want to bring to you this thought of the philosophy of life and the joyous attitude and floating of those good humors that Hippocrates talked about. You know, I think in these meetings one of the things that we have done is to bring about a realization of that philosophy, because here in addition to the splendid papers that we have heard, there has been acquaintanceship and mixing, one with the other, and to my mind there is nothing so fine in the world as friendship, fellowship and comradeship. All these things make life worth living and they are the very finest gifts from Heaven. You have gotten them here unconsciously, and perhaps you have not realized that you have in many ways been getting the philosophy of physical therapy.

PHYSICAL THERAPY CLINICS

RADIOLOGICAL CLINIC

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We have the pleasure of being able to show you three clinical cases this morning, all of them interesting in some particular phase. The first one which is now before you is a white male, age 48 years, who entered the hospital one week ago with the following history which will be read by the interne:

Carcinoma of the Tongue

CASE HISTORY

Case No. 24160: J. K., a white male 48 years of age, who has been engaged in the cigar business, walked into the hospital, complaining of a sore on the back of the tongue, accompanied by difficulty in swallowing and lumps in both sides of the neck. His previous history is essentially negative except that he had a venereal sore on the penis twenty-five years ago.

His present illness began six months ago when he developed a sore on the back of the tongue on the left side in the region of the molar teeth. He thinks he cut the tongue on a jagged tooth. Three months ago a nodule appeared in the left side of the neck which rapidly enlarged until the whole tongue became thick, hard, and made it impossible to swallow solid food. Since that time he has had much pain, has been unable to sleep at night, drools constantly and has lost 70 pounds in weight. When he consulted his physician six months ago the blood Wasserman test was 4 plus, following which he received 13 intravenous injections of neosalvarsan.

PRESENT FINDINGS

At the present time the blood Wasserman test is negative, both by the incubation test and ice box method. The urine is negative. A complete blood count shows hemoglobin 80 per cent, white cells, 4,880,000, polys 75 per cent, small lymphocytes 24 per cent, large lymphocytes 1 per cent.

X-ray examination of the left mandible shows no bone pathology. Physical examination reveals an emaciated white male with normal physical findings except in the neck and mouth. There are palpable glands varying in size from 1 to 3 cm. on both sides of the neck. The root of the tongue is enlarged and very hard. On looking into the mouth the tongue is seen to fill the mouth. The gloved palpating finger feels the entire tongue from tip well back into the pharynx boardlike. A deep ulcer with indurated margins is found on the left posterior quadrant. The induration is confined to the tongue. The mandible and the cheeks are normal. The breath has a very disagreeable, foul odor.

DISCUSSION

As the history and physical findings were read to you, several significant facts were doubtless noted. Briefly, the record shows that about six months ago the patient noticed an ulcer on the dorsum of the posterior left quadrant of the tongue. This ulcer was painful and the portion of the tongue about the ulcer was hard and from the ulcer a foul smelling odor was noticeable. This odor has a peculiarly pungent quality which once smelled can never be mistaken for any other. This odor is found in carcinomas involving moist surfaces where necrosis is present.

The history is significant in that it shows the induration gradually advanced until at the present time the entire tongue is of boardlike hardness. As one places the gloved finger in the mouth, he is impressed with the extreme hardness of the induration and as the finger is passed around over the tongue the entire organ is found involved. The crater-like ulcer can be

felt on the dorsum of the left posterior quadrant, extending slightly to the right of the median line. The induration is confined entirely to the tongue itself, no evidence being found of involvement of the jaw or cheek.

Now let us palpate the neck. At once we find the root of the tongue is distinctly palpable and is felt as a hard mass occupying the central portion of the neck and movable with the hyoid bone, but extending below the hyoid as far as the larynx. In addition to the tongue several masses varying in size from 1 to 3 centimeters in diameter are found on both sides of the neck. These masses have the feel and are in the proper location for enlarged lymph glands. The patient swallows liquids with great difficulty.

He has lost 70 pounds in weight during the past six months. This loss of weight is doubtless due to the fact that he is unable to swallow food sufficient to give the required caloric value, as well as the fact that he is suffering so much pain that he is unable to obtain sufficient sleep during the night.

An early diagnosis in this case was not made by his medical advisor because of the fact that a positive venereal history twenty-five years ago was obtained and because a blood Wasserman test was positive 4 plus. Let us inquire into this a little. Secondary lesions of syphilis are always found in the mouth as mucous patches which are multiple and are accompanied by the skin eruption. The primary lesion of syphilis is occasionally found in the mouth. The most common site is on the lips or the tip of the tongue, but rarely is it on the posterior half of the tongue. Tertiary lesions of syphilis are rarely, if ever, found in the tongue. In this particular case the lesion could have been only of the tertiary type if syphilitic. The patient is of the cancer age with a venereal history twenty-five years ago, the initial lesion being on the penis. In this patient the induration in the tongue steadily advanced in spite of thorough saturation with anti-syphilitic medication which was continued until his Wasserman test is now negative. The diagnosis of advanced carcinoma of the tongue cannot now be questioned.

Let this case stamp our memory indelibly with the fact that a patient who has had a previous syphilitic infection and who now has a 4 plus Wasserman test may also have cancer. In other words, let us exercise our clinical judgment in drawing conclusions about the patient, using the various laboratory tests as a part of the evidence rather than letting them make the diagnosis for us.

TREATMENT

Surgical treatment would only be of value were it possible to remove the entire growth with sufficient certainty to justify the risk of the operation. In this case, removal of the entire tongue would be necessary as well as dissection of the cervical glands on both sides of the neck. The patient has refused this operation and we think he acted wisely. Gastrostomy will be held in reserve to be used when indicated. Radium treatment with quantities ordinarily available would be painful and result in considerable local irritation and discomfort.

High voltage x-ray therapy offers the patient the most help with the least discomfort. This treatment can be applied not only to the entire tongue, but to the cervical glands as well. The dosage will be administered in such a manner that all the involved tissues receive practically a homogeneous radiation. This can be accomplished by measuring the thickness of the part and from this measurement estimating the proper dosage for this particular patient. The technic employed will be governed by the following factors: Voltage 200,000, distance 50 cm., filter 1 mm. copper, 1 mm. aluminum, milliamperes 4, time as indicated by the measurements.

(Note: Two weeks after the treatment indicated above the size of the tongue had diminished 20 per cent, the glands had reduced 50 per cent and the patient was able to swallow soft food, showing the value of radiation as a palliative agent.)

The interne will now read the history of the second case.

Teratoma of Testicle—Metastasis to Periaortic Glands

CASE HISTORY

Case No. 23834: E. A. B., a white male aged 32, walked into the hospital, complaining

of constant aching pain in the back and upper left side of the belly. The pain has been present for about two months, is gradually increasing in severity until now it keeps him awake most of each night. Recently he has noticed a swelling in the upper left side of the belly.

His previous history is negative until February, 1924, when he thinks he "strained himself" lifting. Following this he developed a swollen left testicle. His physician put him to bed for one week, applying hot packs, after which he returned to his work as street car conductor. The testicle remained large and when at work he felt a constant dragging sensation, so that he was forced to consult his physician again. Operation was recommended, and in May, 1924, the left testicle was removed. The testicle was largely occupied by a solid, new growth which proved on microscopic examination to be teratoma. The cord was pulled down and cut off as high as possible. An uneventful recovery was made.

The patient returned to work and remained well until February, 1925, when he began to have backache in the upper lumbar region, slight at first, but gradually increasing until he was forced to give up his occupation. As the pain became more intense he also noticed a swelling in the upper part of the left side of the abdomen.

PRESENT FINDINGS

Physical examination is normal except that the left testicle is not present. There is a small scar in the left side of the scrotum where the incision was made for removal of the testicle. The inguinal and iliac glands are not palpable. A palpable mass is felt occupying the left upper quadrant of the abdomen where it seems to push out from underneath the left costal margin, extending to the median line and downward to the level of the navel. The mass feels smooth, solid, is not movable and no notch is palpable. The median and inferior borders are rounded. The colon rests in front of the mass.

Cystoscopic examination made by Dr. McMartin shows the bladder normal with normal urine flowing from both ureters. Functional test is normal. Opaque catheters were passed into both ureters and 15 per cent sodium iodide solution injected into the left kidney pelvis to tolerance, after which a pyelogram was made. The pyelogram shows the left kidney pelvis flattened and displaced outward and upward beyond the normal limits. The blood count is normal except for a slight secondary anemia and the blood Wasserman test is negative. X-ray examination of the lungs fails to demonstrate metastases.

CONCLUSIONS

Taking into consideration the history of removal of a teratomatous left testicle followed by a retroperitoneal mass in the upper quadrant of the same side of the abdomen, coupled with the displacement of the left kidney outward and upward by the mass, and with normal function of the left kidney, we are forced to conclude that we have here a teratomatous metastasis into the periaortic glands.

TREATMENT

Our surgical consultant, Dr. Simanek, thinks surgical removal impossible.

Radiation therapy, then, is the method of choice.

Radium in quantities ordinarily available is also impractical.

High voltage x-ray therapy can be applied in such a manner as to give practically homogeneous radiation through the mass, and should retard the advance of the growth or even diminish its size and thus relieve the pain. In fact, high voltage x-radiation was given the patient three weeks ago and you are now seeing what has been accomplished by it. You can see a definite tanning of the skin of the abdomen and the back over the area treated. You notice that there is no prominence in the left upper quadrant and when you palpate the abdomen you notice the mass is scarcely palpable. The patient tells us that he is free from the back pain.

Someone has just asked how the treatment was given. The patient was put to bed and thoroughly alkalinized by giving soda bicarbonate gr. XXX every four hours during the course of treatments. When the patient was taken to the treatment room he was placed upon the treatment table in the position to be used. The area to be treated was marked on the skin with

an indelible pencil. With calipers the thickness of the parts was measured. From these measurements the dosage for this particular patient was estimated, using the Dessauer charts as modified by Bachem. The following table is copied from his treatment record:

Part	*Depth Ant.*	*Depth Post.*	*% Ant.*	*% Post.*	*% Total*
Skin	0	20	100	12	112
Tumor	10	10	43	43	86
Skin	20	0	12	100	112

From the above table it is seen that the skin over the abdomen and that over the back received 112 per cent of the arbitrary erythema dose adopted as standard. We have learned by experimentation and by experience that 120 per cent of this arbitrary dose will cause vesication. This patient demonstrates the necessity of carefully estimating the dose in each case. The erythema or tanning of the skin which you see here is that produced by 112 per cent of the skin unit dose. In giving this treatment the following technic was employed: voltage 200,000 (peak), distance 50 cm., filter 1 mm. copper and 1 mm. aluminum, milliamperes 4, time 150 minutes anterior and 150 minutes posterior. This dosage was broken up into four successive daily applications. We have found the patients bear the treatment much better when administered in broken doses.

DISCUSSION

Following the first application over the abdomen the patient vomited once. At no other time during the course of treatments did he vomit. Forty-eight hours after the first application considerable reduction in the size of the mass could be detected by palpation. Ninety-six hours after the first application marked reduction in the size was demonstrable both by palpation and by pyelogram.

At the end of one week further reduction had occurred and at the end of three weeks the mass is scarcely palpable.

It is my opinion that the rapid reduction in the size of vascular new growths following radiation is due to devascularization. It has been proven by extensive investigation on the part of Warthin, Ewing and others, that within twenty-four hours after radiation the endothelium lining the blood vessels becomes markedly swollen. This increases until the lumen of the smaller capillaries is occluded, thus shutting off the blood supply. While the devascularization process is going on the action of the rays on the parenchymal cells is getting under way, the two processes healing by fibrosis. The end result, then, of radiation is fibrosis.

In this particular patient the growth is so large that we can only hope for palliation, relieving him of pain and prolonging his life six months to two years beyond which he would live if untreated. We know of no other agent which can accomplish as much.

This case runs true to form for teratomas of the testicle. They metastasize very early, usually before the diagnosis is made. They metastasize by both the lymphatic route, as in this case, and also by the hematogenous route. Because of the large percentage of metastases through the blood stream it is quite necessary to make x-ray examination of the chest in all these cases as soon as they present themselves.

Frequently teratoma of the testicle is mistaken for hydrocele. There is a very simple test which can be made by anyone, anywhere, which will differentiate between hydrocele and solid tumor of the testicle. To make the test, take a piece of heavy wrapping paper about 8½ by 11 inches in size and roll it so the diameter of the lumen is about one inch. Holding the scrotum and affected testicle up, place the end of the paper tube against one side in such a manner as to exclude all light. While an incandescent light is held near the side of the scrotum opposite the paper tube the eye of the examiner looks through the tube. If hydrocele, the tumor is translucent; if a solid tumor it is opaque. By this simple test early positive diagnosis can be made which followed by early surgical removal will minimize the chance for distant metastases.

The interne will now read the history of the third case.

BANTI'S DISEASE

CASE HISTORY

Case No. 24228: Mrs. L. H., a white female 36 years of age, is admitted, complaining of a large tumor in the abdomen which is ac-

companied by occasional attacks of sharp pain, loss of weight and weakness. Her family history shows that her father died at the age of 50 from carcinoma of the stomach, while her mother died at the age of 70 from cancer of the spine.

The previous history of the patient shows that she was married at the age of 18. She has four living children and has had five miscarriages. In 1922 she had a cholecystectomy.

In January, 1923, while running to catch a street car, she developed a severe pain in the left side of the abdomen which incapacitated her. During the physical examination to determine the cause of the pain, the physician found a very large tumor occupying the left half of the abdomen and extending slightly to the right of the midline. An exploratory laparotomy proved the mass to be a large spleen. During the past two years the tumor has slowly increased in size. Two additional attacks of severe pain in the spleen have occurred. At other times certain areas in the spleen become very tender to pressure. She has lost 22 pounds in weight and has gradually grown weaker, together with a growing sense of weight in the abdomen.

PRESENT FINDINGS

The patient is anemic and quite thin with a protruding abdomen which is found to be occupied by a mass extending downward to the pubes and to the right of the median line. The mass projects out from under the left costal margin, is firm, has a sharp edge in the upper right portion of which is a definite notch. There is no fluid in the abdomen. The liver is not palpable and there is no jaundice. There are no enlarged lymph glands.

Blood count shows 60 per cent hemoglobin, red cells 3,872,000 leukocytes 6,450, polys 52 per cent, small lymphocytes 45 per cent, large lymphocytes 3 per cent. Blood Wasserman test is positive 3 plus by the ice box method. The urine is negative.

DISCUSSION

After hearing the history and finding such a large spleen, one naturally thinks of splenomyelogenous leukemia, but as soon as the blood picture is obtained leukemia is ruled out, since there is no increase in the white cell count and there are no abnormal cells present.

New growth of the spleen is thought of because of the fact that both her father and mother died from cancer. Her age, however, is against that diagnosis as well as the absence of any demonstrable primary growth.

Malarial spleen comes up for consideration, but the patient has never had malaria nor has she ever lived in a malarial district.

Banti's disease must also be considered. In favor of this diagnosis is the insidious onset, the tumor having attained practically the size you see her today without the patient knowing it until found by her physician. The attacks of acute pain in the spleen are frequently associated with Banti's disease. She has developed a considerable anemia with no characteristic blood changes. She has lost 22 pounds and has grown very weak. She has had four healthy children and five miscarriages during her married life of eighteen years. She also has a 3 plus Wasserman test.

Taking all of the evidence into consideration, I feel that we are justified in making a diagnosis of Banti's disease.

TREATMENT

Surgical removal of the spleen is generally conceded curative in Banti's disease. This has been attempted in this patient and found impractical. She is being treated medically, by rest in bed and the administration of iron and arsenic by mouth.

Today we shall begin the series of high voltage x-radiation, cautiously administered in small broken does, introducing into the spleen only about 40 per cent of the skin unit dose. After a six-week interval we shall probably repeat this dose if conditions warrant. (Applause.)

(Note: Following the above treatment the size of the spleen rapidly diminished and the patient regained her health so that she was able to attend to the routine household duties. She has remained well more than three years.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

CHRONIC OTORRHEA

RECENT ADVANCES IN THERAPY

Probably no single therapeutic measure has given such uniformly satisfactory results in selected cases of suppurative otitis media as zinc ionization. First introduced by Leduc and more thoroughly developed by Friel, zinc ionization, in the hands of those familiar with its technic, has effected cures difficult if not impossible to secure with the older methods of treatment.

Friel has concentrated on this newer therapy for a decade or more and has worked out many of the finer details so necessary for the success with any agent. More important, his extensive experience in this field has enabled him to define the indications and limitations. The promiscuous employment of zinc ionization for discharging ears without due regard for the pathology present and its indication for this therapy is not only unscientific, but unfair to the possibilities with this procedure when properly applied in definitely selected cases.

McArthur has aptly pointed out in his own way the class of otorrheas suitable for the zinc ionization method. These are the cases with a large open perforation with no retention of pus. "The discharge is mucopurulent in character, there is no odor unless stagnation occurs in the meatus and the amount varies according to the hygienic care bestowed on the ear by the patient. A vigorous course of treatment by syringing and drops under the supervision of the otologist frequently effects a cure. Here the infection is obviously limited to the tympanic cavity, there being no evidence of mastoid involvement or tubal infection. Nevertheless a certain proportion of cases fail to clear up and we have either the humiliation of repeatedly telling the patient to "go on with the drops," or of submitting them to the radical mastoid operation. At operation we frequently find an antrum about the size of a bead and containing a small amount of detritus. Not much more is found in the tympanum and we feel that we have taken a sledge hammer to crack a nut. It is here that ionization appears to be useful in preventing these two contretemps."

"It might be thought from the foregoing that cases suitable for ionization have been whittled down to the vanishing point, but the chronic otorrheas of the class described form a fairly large proportion of the whole."

There have been numerous champions of zinc ionization for chronic otorrhea. In Europe, Jobson and Fraser, and in Australia, McArthur, have applied this treatment in large series of cases with marked success. In this country, Warwick, Granberry, Fox, Kanter and many others have been able to substantiate the good results obtained by Friel and his confreres. The failures of Nora Lister cannot be explained on any other basis than incorrect selection of cases or incorrect technic. Jobson is probably more careful in the preparation of an ear for ionization treatment. His favorable results may to a large measure depend on this preliminary treatment. Jobson concluded as a result of his experience that ionization will cure any case of otorrhea that is curable by "drops," that it will do this in one hundredth part of the time taken by "drops," thus saving an enormous amount of the time of patients, doctors, nurses and hospitals, that it will cure a large number of infections which do not respond to the ordinary antiseptic treatment.

One important and valuable contribution to the method as a whole has been made in this country in improving the apparatus. By means of a self-retaining ear speculum the procedure has been greatly simplified. This newer apparatus, devised by Hollender and Cottle, has met with great favor by those interested in this work.

During the 1928 meeting of the American College of Physical Therapy, otologists in this

country had the opportunity of hearing, first hand, of Friel's clinical experiences with zinc ionization. His contributions at this congress, while not altogether new, were personal messages on this very important subject. The papers will be found elsewhere in this issue. They represent an earnest endeavor to present to the profession an improved therapeutic means for one of the stubborn affections which the otologist is frequently called upon to manage. In view of the fact that numerous specialists have already adopted the method and appreciate its status in otologic therapy its more general use is merited for the benefit of those patients who have not been accorded the opportunity of its use.

Friel's work is outstanding. Although more than a decade has passed and ample opportunity has been afforded for thorough trial, only a minority report has appeared in the literature to refute the many unusual successes achieved by prominent foreign and American clinicians.

There is nothing extraordinary in the procedure. There is nothing baffling in the technic. No expensive apparatus is essential, nor is a wide or special training in electrotherapy necessary. In fact the introduction of galvanic ionization had little if anything to do with modern electrotherapy. The advent of both at about the same time was merely a coincidence. The otologist will sooner or later be forced to adopt zinc ionization as one of his most valued measures in the treatment of simple uncomplicated otorrhea, not only by reason of what others have accomplished with it, but because of the inadequacy of the older non-surgical measures. It appears, at present, at least, as a definite advance in otologic therapeutics.—A. R. H.

RADIUM POISONING UNDER FIRE

A thorough investigation of the effects of radium upon workers in the clock industry, where the substance is employed in luminizing watch and clock dials, and means of guarding the workers against it, is being undertaken by the United States Public Health Service, the surgeon general, Dr. Hugh S. Cumming, announced orally December 21.

Following a conference on December 20, representatives of the industry and officers of the Public Health Service, it was decided to undertake the investigation, said Dr. Cumming. It was agreed at the conference that further precautions are necessary.

Dr. Cumming called the conference following occurrence of radium poisoning in New Jersey dial factories where seven men and thirteen women lost their lives and 23 other persons suffered injuries. All of the workers afflicted had been engaged in painting the dials of luminous watches and clocks with brushes dipped in radium paint.

Two committees will be appointed by Dr. Cumming within the next few days to pursue two distinct lines of investigation, he said. The first will study health conditions among radium workers and the second will codify the best known methods of application of precautionary measures.

Dr. H. S. Martin, medical examiner of Essex county, New Jersey, in relating of the cases, said that daily exposure to the penetrating radium rays unquestionably has serious effects. In certain cases, he explained, the injurious effect of radium poisoning might not appear until years later.

The blood-forming organs are the ones first attacked by radium, said Dr. Martin, causing a form of pernicious anemia. Moreover, he declared, "swallows" of radium emanations from the air cause a "bombardment within the body of the vital blood-forming particles by the most destructive rays known to science." He recounted numerous cases where medical scientists suffered severe injuries in their experiments with radium.

Dr. R. C. Moore, of Purdue University, differed with Dr. Martin, however, stating that he had suffered no harm after prolonged exposure with large quantities of radium in laboratories. "Radium has saved many more lives than it has lost," he declared.

Dr. Martin said this was not comparable to the daily contact of factory workers who are constantly placing the radium-dipped brushes between their lips.

PROFITS FROM PATENT TO BE GIVEN TO SCIENCE

Vitamin D expert says commercialization returns go to foundation.

Harry Steenbock, University of Wisconsin professor, who discovered that matter irradiated by quartz mercury vapor lamp rays develop calcium-building qualities, or Vitamin D, essential in development of bone in men and animals, today announced the commercialization of his patent.

Vitamin D, or the sunlight vitamin, is the greatest contribution toward cure of rickets in children and animals. Steenbock has given his discovery without profit, to the Wisconsin Alumni Research foundation.

The foundation is an organization of wealthy University of Wisconsin alumni, developed at Steenbock's behest, to protect the interests of his fellow scientists, the school and the public or any invention or discovery. It furnished the original funds for patents on the Steenbock process and sold rights on its development in the food line to a cereal company.

All moneys derived from the sale of these developments rights and Prof. Steenbock has admitted that they may run into millions, will be administered by the foundation for further research by University of Wisconsin scientists.

THE STUDENT'S LIBRARY

BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

ROENTGENKUNDE IN EINZELDARSTELLUNGEN-HERAYSGEGEBEN VON. *H. H. Berg,* Berlin und *K. Frik,* Berlin Band. 1.

ROENTGENOLOGIE — DES FELSENBEINES UND DES BITEMPORALEN SCHADELBILDES— mit Besonderer Berucksichtigung Ihrer Klinischen Bedeutung. *Von Dr. H. W. Stenvers,* Utrecht, mit 324 Abbildungen. Berlin, Verlag Von Julius Springer, 1928.

PHYSIOTHERAPY-THEORY AND CLINICAL APPLICATION. *Harry Eaton Stewart,* M.D., Director, New Haven School of Physiotherapy; attending specialist in physiotherapy, U. S. V. B.; Consultant in physiotherapy, N. Y. N. H. and Hartford, R. R. Co., Form. Asst. Dir., Sec. on physiotherapy, office of the Surgeon General, U. S. A. and Supervisor of Physiotherapy, Bureau of U. S. P. H. Service. Second edition, revised; 92 illustrations, 414 pp.; cloth; $7.50 net. Paul B. Hoeber, Inc., Publishers. 76 Fifth Avenue., New York.

THE NORMAL AND PATHOLOGICAL PHYSIOLOGY OF BONE. By *R. Leriche,* Prof. de Clinique Chirurgicale a la Faculte de Strasbourg and Turn A. Policard, Prof. d'Histologie a la Faculte de Lyon. Translated by *Sherwood Moore,* M. D., Prof. of Radiology, Washington Uni. School of Med. and *J. Albert Key,* M. D., Asst. Prof. Clin. Orth. Surg., Washington Uni. pp. 224. Illustrated. C. V. Mosby Co., St. Louis, Mo., 1928.

THE THEORY AND PRACTICE OF RADIOLOGY. By *B. J. Leggett* ,Vol. 1, Cloth, $4.00; pp. 250 with 188 illustrations. C. V. Mosby Co., St. Louis.

THE THEORY AND PRACTICE OF RADIOOGY. By *B. J. Leggett,* Vol. 2, Cloth, $6.00; Pp. 318 with 191 illustrations. C. V. Mosby Co., St. Louis.

THE THEORAY AND PRACTICE OF RADIOLOGY. By *B. J. Leggett,* Vol. 3, Cloth, $10.00; Pp. 560 with 530 illustrations. C. V. Mosby Co., St. Louis.

BOOKS REVIEWED

ACTINOTHERAPY (With Special Reference to Ultraviolet Radiation) for Practitioners and Students by D. D. Rosewarne, M. R. C. S. (Eng.); L.R. C. P. (London); Pp. 237—with 20 illustrations, including a colored plate. C. V. Mosby Co.,St. Louis, Publishers, 1927

This small volume was intended to fill an evident gap in the rising tide of popularity of ultraviolet therapy. It is intended as a textbook but is really a primer, for it deals with first principals. It, however, does this well, and as such, it may be considered a worthy text and a contribution to the literature. The author

has divided his subject into the physical aspects of radiant energy, the biological effects of light and the clinical application of actinotherapy. Through the eyes of the author, the novitiate glimpses the vast panorama of the transformation of energy, and in what manner this takes place. Artificial sources of various lamps are compared to the natural source, the sun, and their utility and practicability is explained in simple language. A tremendous amount of material was compressed into the confines of the early chapters, and in consequence of this much of the author's statements appear somewhat dogmatic. For example the Quantum theory of Planck is dealt with in a very cursory manner. Only one short sentence is devoted to it, in spite of the fact that it is considered one of the keynotes to the modern theory of radiant energy. It wets the mental appetite but does not enlighten the avid student. Indeed, only those who have had more than a passing acquaintance with this fascinating theory will appreciate the abbreviated style of the book. The greater number of readers will be confused or irritated because of the absence of detail. An entire chapter should have been devoted to this as well as to the theory of Bohr. There is a danger in the sacrifice of details for brevity, that is nowhere more appreciated than by the medical student entering the realm of photodynamics and the study of radiant energy. Similar, but constructive criticism may be advanced for the second division: The Biological Effect of Light. One readily appreciates that the author is familiar with the recent advances in photobiology but the burden of transmitting his information to the unitiated in a digestible form has made him commit the error of writing too briefly and omitting material facts of great importance to the subject. While it is acknowledged that ultraviolet therapy has been admitted to the inner circles of present day orthodox medicine, it is still a much misunderstood subject. The student, if he is critical will demand his information in greater detail; the busy practitioner will accept his information in capsule form until he meets with disaster. The author, as indicated in his preface, is cognizant of the limitations of his present work and has attempted the ever dangerous choice of staying in the midroad of his subject. By such a choice we suspect he feels that he can distribute digestible information to the widest circle of readers. Unfortunately the risk is too great and he will be assailed at both ends. The beginner will be confused because of the lack of detail; the critical reader will be irritated for the same reason, and the informed reader who needs the guidance of the author least will be the most pleased because he will have been given the benefit of the author's splendid summary of the subject.

From a practical point of view the part of this book which deals with the practical application of actinotherapy is of greatest value. We see therein the guiding hand of an oriented teacher. He indicates the limitations, the dangers and the possibilities of actinotherapy. Indications and contra-indications are pointed out. Negative as well as positive results are indicated. The case reports are clinching points in evidence as to effectiveness of the technic employed and the utility of actinotherapy in certain pathologic states. One sees a conservatism that establishes the waning confidence of the critical and hostile reader. The frankness with which the entire subject of actinotherapy is discussed admits of the conclusion that honesty and intelligence and orientation to the subject have been, in part with other noteworthy factors, the motive for the writing of this valuable book.

INTERNATIONAL ABSTRACTS

Ultraviolet Therapy in Angina Pectoria. Ernst Freund. Wien. Med. Wchnschr., 25:873, June 21, 1928.

The essential factor in the favorable results with quartz lamp therapy reported by Freund lies in the production of a deep and intense dermatitis. The technic consists in segmental exposure of areas of the heart and protecting the non-radiated areas by thick towels. First, a wide area from the jugular region to the xiphoid and between the two mammary lines are radiated. The second radiation takes in the entire left side of the chest with the left arm resting on the head. The third radiation is mostly on the back exposing an area about the same size as that anteriorly (first treatment). Further treatments may take in an exposure of the left forearm to the corresponding shoulder or occasionally the right side of the body may be radiated, if pains are referred to that region. The radiations are given with an interval of six to twelve days between treatments. The second series of treatments may be more intensive, due to the protective pigmentation formed during the first treatments. The dosage varies with the power of the lamp. With a new burner 220 volts, 80 cm. distance, and ten to fifteen minutes exposure has been found sufficient. The object is to produce a definite reaction. If the burner is older, the distance may be decreased and the time lengthened accordingly. Thirty-four cases were thus treated, with very good results obtained in 13, improvement noted in 11 and the remaining 10 were not in any way affected. The type of underlying organic etiology did not play any part since favorable results were also noted in two cases of luetic aortitis, and one case of secondary hypertension with contracted kidneys—all were in

young individuals. The anginas on a nervous basis were not favorably influenced as a rule. The basis of the good results obtained following ultraviolet therapy was in the production of a local hyperemia followed by a consequent reflex peripheral vasodilatation and a limitation of vasoconstriction.

The Diagnosis and Treatment of Enlarged Thymus by X-Ray. F. W. O'Brien. New England J. Med. 199:657-661, Oct. '28.

Since there is no evidence that the hymus is not an integral causative factor in the type of death under discussion, and it is known that involution of the thymus takes place rapidly and *without harm* (Hammar, loc. cit.) following x-ray or radium treatment, it would appear not only desirable but requisite, until such time as more exact knowledge or experience shall warrant a contrary opinion, to prescribe radiation therapy for those children presenting x-ray evidence of "broadened mediastinal shadow" without symptoms in whom general anesthesia or surgery is contemplated.

Diaphragmatic Hernia. R. G. Giles. Texas St. J. Med. 24:418-421, Oct. '28.

Roentgen ray examination is practically always necessary to establish the diagnosis of diaphragmatic hernia. This condition is infrequent but not rare. The history is unusual and the signs and symptoms are not pathognomonic. Hernia of the diaphragm was formerly an autopsy discovery just as it is now an x-ray discovery.

Reradiation. R. H. Crockett. Texas St. J. Med. 24:439-442, Oct. '28.

There should be more uniformity in regard to the time and amount of dosage in each type of case, where x-ray and radium treatments must be repeated.

The large number of truths concerning reradiation known to radiologists as a group should be quickly disseminated to the individual radiologist so that their respective patients may be benefitted accordingly.

The Treatment of Eczema. C. F. Lehmann and E. D. Crutchfield. Texas St. J. Med., 24:433-439, Oct. '28.

The whole treatment of eczema may be said to consist of the following: To remove the cause; to protect from irritation; to remove all secretions, and to use stimulants only in treatment at the hypertrophic stage or end process of the condition. Absorption should be promoted by an increased blood supply to the affected parts, and biological changes produced by such physical agents as ultraviolet and x-rays.

Iodized Rape-Seed Oil (Campiodol) for Cerebrospinal Visualization. C. H. Frazier and M. A. Glaser. J. A. M. A. 91:1609-1614, Nov. 24, '28.

As the result of various substances for cerebrosopinal photography, the iodized oils seem at this time to offer the greatest promise. Iodized rape-seed oil (campiodol) diluted with ethyl olive oil has been found to be the most satisfactory of the oils investigated. Physically and biologically it seems to be ideal, and its practical value after spinal, cisternal, vascular and ventricular injection has been demonstrated.

Intrapleural Pressures in Massive Collapse of the Lung. C. C. Habliston, M. D. Am. J. Med. Sc. 176:830-836, Dec. '28.

Four cases of atelectasis of the lung due to four different etiologic factors are reported. A marked increase in intrapleural negative pressure has been demonstrated in each. High negative intrapleural pressures are constant accompaniments, and are characteristic of massive collapse. This pressure change is directly responsible for the physical findings of cardiac displacement, and is the factor underlying the symptoms of dyspepsia and cyanosis. Partial pneumothorax, reducing the negative pressure to within normal limits has given immediate symptomatic relief.

The Effect of Lateral Posture in the Examination of the Chest. H. W. Dana. New England J. Med. 199:774-776, Oct. '28.

Since it is frequently necessary in patients too ill to sit upright in bed, to examine the chest with the patient lying on one side, changes in the physical signs over the lungs in the lateral positions are of clinical importance.

Frequently, the physical signs in the lungs are quite confusing in the lateral position so that it is often difficult to determine on which side consolidation is present.

Normally, the dependent side of the chest shows increased lung signs, increased spoken and whispered voice and louder breath sounds. At the same time, there is improved resonance over the dependent lung, and decreased resonance over the non-dependent lung.

The improved resonance over the dependent lung is largely transmitted from the mattress and bed spring, while the decreased resonance over the upper, non-dependent lung is due to compression together of the ribs of the concave upper side of the chest, so as the result of the curvature of the spine from the natural sagging of the bed spring.

Rales, when present at the base of one or both lungs, are better heard over the dependent lung.

To get a fair conception as to pathologic changes in the lungs in patients unable to sit upright in bed, such patients should be examined in both lateral positions.

The Diagnostic Value of Cholecystography. F. T. Lord. New England J. Med. 199:773-774, Oct. '28.

The determination of gall-bladder function by cholecystography is of great diagnostic value but, whether positive or negative, cannot alone be relied upon to indicate the presence or absence of gall-bladder pathology.

Studies in Rickets, Prevention by Means of Ultraviolet Irradiation. T. K. Selkirk, J. V. Greenebaum and A. G. Mitchell. J. A. M. A. 91:2057-2060, Dec. 29, '28.

Three hundred and eighty-six babies were studied to determine whether ultraviolet irradiation was a practicable method to use for the prevention of rickets. Clinical and roentgenographic examinations were made up to and including eight months of age. When twins, premature and syphilitic infants, and babies lost from observation were eliminated, 237 cases remained for analysis. These were divided into four groups in order to eliminate the complicating factor of cod liver oil. The infants in the group receiving irradiation and no cod liver oil showed 17 per cent of rickets, as compared with 56 per cent of the control group who received no irradiation and no cod liver oil. No baby receiving more than sixty-five minutes' total treatment up to eight months of age developed rickets. Most of those developing rickets had intervals of two or more months without treatment. It was found that eleven minutes' total irradiation a month without any other antirachitic measures prevented rickets in 98 per cent of the babies studied up to eight months of age. A smaller amount than this was found to be efficacious in many cases, particularly when the treatments were given regularly and the lapses between treatments were not too long.

A small amount of ultraviolet irradiation from an efficient artificial source is a practicable method of preventing rickets in the human infant if it is started early and given regularly.

Ultraviolet Rays in the Treatment of Eye, Ear, Nose and Throat Conditions. C. R. Brooke. J. Med. Soc. New Jersey 15:695-699, Nov. 1928.

The ultraviolet rays properly applied to tissues have proved to be an effective germicide and a decided aid in the treatment of ear, nose and throat conditions. A carefully systematized technic of application must be employed to derive maximum benefit. Ultraviolet radiations must be employed with care and only by one acquainted with the physical action of such therapy on the tissues Ultraviolet ray therapy locally and generally applied to the body, via the modern mercury vapor and carbon arc lamps, is an important addition to our treatment armamentarium.

Cholecystography and Transduodenal Biliary Drainage. W. Snow. Am. J. Roentgenol. 20:358-363, Oct. '28.

Over 90 per cent of the author's cases that had both duodenal drainage and the Graham test gave similar results insofar as they both pointed to a normal or abnormal condition. A gall-bladder that gives a normal Graham test and a normal duodenal drainage test is usually normal at operation. Failure to obtain "B" bile (gall-bladder bile) by the drainage test, usually means failure to visualize the gall-bladder with dye and a pathological gall-bladder at operation. Gall-bladder cases that have stones, either calciñed or radiotransparent, usually yield pathological bile by the drainage test and often no "B" bile.

Visualization of the gall-bladder without dye is not of diagnostic aid. A large gall-bladder, however, which visualizes faintly before and after dye and does not empty after fatty food means a definite pathological condition; in our cases a hydrops of the gall-bladder. The drainage test yielded no "B" bile in our cases. We feel that the surgeon should have other strong indications before operating upon patients who have abnormal "A," "B," or "C" bile and whose gall-bladder shadows show adhesions or poor emptying.

Present Status of Diathermy in Pneumonia. H. E. Stewart. J. Med. Soc. New Jersey, 25:688-691, Nov. '28.

Diathermy in pneumonia is, in skilled hands, an absolutely safe procedure. Many thousands of individual treatments have been administered without a single untoward effect. Obvious symptomatic improvement felt by the patient and readily observable, is the rule. The temperature falls, by lysis in nearly every case, conserving for the body that large amount of energy which would otherwise be expended by sustained high temperature. That patient who does not improve symptomatically under diathermy, presents a grave prognosis. The writer has treated, studied and tabulated his cases for six and one-half years. This group includes many different epidemics with varying mortality and all types of the disease including streptococcus cases. It is only within the year that any claim has been made for lowered mortality under diathermy treatment. The writer's mortality figures, together with those of very many others, now running into thousands of cases, seem to have established this point beyond any doubt. Many interesting points could be developed in favor of the use of diathermy over that of serum. Diathermy is applicable to all types, and no delay for laboratory report is necessary. There is no increased illness comparable to serum sickness and no sudden deaths like those from anaphylactic shock. Where serum is indicated there is no reason why diathermy cannot be combined with it, nor do any other factors in routine treatment need to be postponed or omitted because diathermy is used.

Through these years of the steadily increasing use of diathermy, the writer has been encouraged by no other factor as much as this, that with the exception of one or two cases, the family physician or consultants who have carefully studied the effect of diathermy on the patient, have been convinced of its value, and have joined the ever widening circle of those who recommend its employment, at least in all severe cases. Several of the largest and finest hospitals in the country are already using diathermy routinely in every case of pneumonia. The writer would earnestly recommend a clinical study of the effect of diathermy in pneumonia by the members of this society.

Some Results of a Study of Roentgenograms of the Abdominal Viscera. R. O. Moody and R. G. Van Nuys. Am. J. Roentgenol. 20: 348-358, Oct. '28.

Long livers having their lower tip in the pelvic cavity as much as 5.0 cm. below the interiliac line are normal. Sex is a factor which affects the length of the liver. More men than women have long livers. A roentgenographic norm has been established for the size of the spleen in healthy young adults. The lower border of the spleen is most commonly found opposite the upper half of the third lumbar vertebra.

Long spleens having their lower border on a level with the lower half of the fourth lumbar vertebra are normal. These long spleens are found in individuals who have no history of malaria. Sex is a factor that affects the length and the shadow width of the spleen. More men than women have long spleens and more men than women have wide spleen shadows. There is strong evidence that in human beings the spleen is considerably larger in the living than in the dead. There is some evidence that exercise decreases the size of the spleen in man and that the loss of blood given for transfusion decreases the size of the spleen in man.

Physical and Biological Problems in Heliotherapy. E. A. Pohle and R. A. Sawyer. Am. J. Roentgenol. 20:338-348, Oct. '28.

A study has been made of the spectral energy characteristics of the mercury vapor lamp. A vacuum type burner run at 110 volts A. C. was used in all investigations. Measurements of the variation of the relative intensity of the lines, 3130, 3022, 2967, 2804, 2650, and 2536 A under varying conditions, i. e., age of burner and operation reported.

The ultraviolet emission has also been measured by a cadmium photoelectric cell in umiol glass, by the starch iodine test, and by the skin erythema. It may be concluded from these investigations that the cadmium cell gives a satisfactory reading of the erythema producing ultraviolet part of the mercury vapor spectrum.

A method is proposed by which the calibration of a photoelectric cell in absolute units can be carried out. This permits checking the sensitivity of an individual cell and calibrating other cadmium cells in the same units. The correlation between this absolute unit and the biological effect (skin erythema) has been established.

Radiographic Examination of All Orthodontic Cases. F. R. Blumenthal. Internat. J. Orthodontia, 14:894-926, Oct. '28.

Radiograms should be taken before any orthodontic treatment is started, regardless of clinical findings. Periodic radiograms should be taken to show just what our appliances are doing. Radiograms should be taken after treatment to check up conditions which may have developed since treatment was started.

Painful Bursitis About the Heel. A. Gottlieb. Am. J. Physical Therap., 5:347-350, Nov. 1928.

Bursitis as a cause for pain about the heel should always be kept in mind. The absence of bone spurs in the x-ray is no proof that bursal sacks are in a healthy state; on the other hand, the presence of exostoses does not indicate that the patient is suffering pain and needs to have them removed by operation. Conservative treatment consists in the application of physical measures, and in providing relief from pressure upon the inflamed region, and in curetting and thoroughly removing all the pathological tissues.

Roentgen Therapy in Bone Tumors. W. A. Evans and T. Leucutia. Am. J. Roentgenol. 20:303-338, Oct. '28.

The roentgen-ray therapy of primary malignant bone tumors and of benign giant cell tumors is governed by the following rules, which are the result of the primary influence of the roentgen rays upon the highly complicated tumor tissues:

1. Cellular tumors without much stroma and rich in blood supply, though clinically and from the surgical viewpoint, very malignant, may be made to disappear entirely by irradiation.

2. Tumors of the adult type, especially when rich in mature intercellular structures (cartilage, bone) and poor in blood-vessels, may prove entirely refractory to irradiation while surgical procedures may lead to excellent results.

3. In tumors of the intermediate type, the more undifferentiated cells may be made to disappear and the growth of the more adult cells may be retarded by irradiation, so that they produce an abundance of calcific (cartilaginous osseous) intercellular substance. A marked sclerosis, with considerable prolongation of life, often results in such cases. In other instances, post-irradiation surgical measures are of distinct value.

The different types of primary malignant bone tumors and the benign giant cell tumor are discussed individually. Decisive proof is brought that roentgen-ray therapy is one of the most powerful assets in the treatment of all varieties of primary malignant bone tumors, as well as in the benign giant cell tumor. "Five year cures" are possible even in cases with extensive metastases and where no other methods of treatment could be of benefit.

It is the contention of the authors, therefore, that the present standard methods of treatment of bone sarcoma and of benign giant cell tumors need a complete revision. Irradiation in the form of deep roentgen-ray therapy should find a more extensive application in all forms of bone sarcoma and giant cell tumor, operable or inoperable, whether in combination with surgical measures, mixed toxins, or the more recent lead therapy.

It remains, then, for the Registry of Bone Sarcoma to collect more complete statistical evidence approving or disproving such a procedure. The Registry has

abundantly succeeded in establishing a standard nomenclature and standard criteria of classification, and we are confident that it will now succeed in establishing more or less standard measures of therapeutics.

The "Massive" and "Hypermassive" Radiation in the Treatment of Skin Cancers. W. A. Evans and T. Leucutia. Brit. J. Radiol. 1: 396-427, Nov. '28.

In reviewing the medical literature with regard to the evolution of the roentgen-ray therapy of skin cancers, four periods may be distinguished.

(1) The period of "burns" or "inflammations." (2) The period of "fractional" treatments. (3) The period of "combined" methods, and finally, (4) the period of "massive" and "hypermassive" radiation.

The method expounded in this article is that of intensive, i. e., "massive" and "hypermassive" radiation. The first postulate of the "massive" and "hypermassive" roentgen-ray therapy is the primary destructive (cytocaustic) effect of the roentgen rays on the carcinoma cells. The practical application of the "massive" and "hypermassive" roentgen ray therapy gives rise to a second postulate: While destroying carcinoma cells, no injury must be done to the normal cells surrounding the carcinoma. These two postulates, of fundamental importance, govern the technic employed in the treatment of the different forms of carcinomata. They are also directly responsible for our rather arbitrary classification of skin cancers into the following groups: (1) Small, superficial, nodular or ulcerated lesions (from 1 to 5 cm. in diameter); (2) medium ulcernodular lesions (from 5 to 10 cm. in diameter); (3) fungous lesions (the proliferation above the skin level being the chief characteristic); (4) large, superficial, ulcerated lesions (from 10 cm. up in diameter, but of only 1 to 2 cm. depth); (5) large, deep-seated ulceronodular lesions (from 10 cm. in diameter and of a depth greater than 2 cm.).

Separation of the Symphysis Pubis During Labor. W. Brehm and H. V. Wierauk. Radiol. Rev. 50:468-471, Dec. '28.

Separation of symphysis pubis occurs during delivery more frequently than formerly. X-ray examination should be used as an adjunct in the determination of any suspicious disproportion between passage and passenger. A separation of 0.9 cm. or less will not cause symptoms. A separation of more than 0.9 cm. will produce symptoms to which careful attention must be accorded.

The Radiological Diagnosis of Hydatid Infection. C. C. Anderson. Brit. J. Radiol. 1: 428-434, Nov. '28.

Where there is sufficient contrast between the hydatid cyst and the surrounding tissues radiographic demonstration is a comparatively simple matter and the interpretation of the shadows obtained is not unduly difficult; but as the densities approximate one another diagnosis becomes a matter of considerable difficulty, resting mainly upon the disturbance of normal contours of organs. Undoubtedly in cases of abdominal infection pneumo-peritoneum should be of assistance in outlining the cyst in such a manner as to facilitate demonstration and diagnosis. The chief diagnostic point is the demonstration of circular, ovoid or elliptical shadows in patients who have lived in sheep country or who are fond of animals, especially dogs, and accustomed to make much of them.

X-ray Treatment of Gonorrheal Inflammation of the Testis and Epididymitis. Dr. M. Lapema. Policlinico. (Sez. prat.) 1928, No. 35.

The very troublesome and protracted cases of orchitis and epididymitis of gonococcal origin which have always taxed the patience of physicians as well as the affected appear to be amenable to the x-rays, according to Dr. Lapema.

Eight cases were treated, six of which received no other treatment except one application. The results have been satisfactory, for the pains invariably disappeared within twenty-four hours, when it was also noted that the swelling subsided. Within a week a cure was established.

The remaining two cases had a recurrence which, however, must not be ascribed to failure of the treatment, as the patients violated the prescribed care.

The technic consisted of one application with a spark gap of 5 cm., a filter of aluminum 3 mm. in thickness, and about 32 cm. distance.

The author is definite in his statement that such a small dose is absolutely devoid of any risk of damage to the tissues of the testicle or epididymis.

The Influence of the X-rays on Tuberculosis of the Lungs. Drs. R. Gassul and S. Sandberg. Wjestrik Roentgenologie, 1927, No. 5.

These well-known investigators radiated 15 patients afflicted with active but slowly progressive pulmonary tuberculosis of nodose or cirrhotic character. In a few cases exudative processes had progressed to a very considerable extent. All patients showed the presence of tubercular bacilli in the sputum, as well as many classic findings. There was some rise of temperature. Cavities were demonstrable in all.

They radiated a field of 400-625 square centimeters at a focal distance from the skin of 50 centimeters, a filter of 0.5 zinc and 3.0 aluminum and a dose of 5-10 per cent H. E. D. Six to ten radiations were given in the course of two to three months. The first treatment was repeated only when there was no reaction of any kind, and never before the first reaction had fully subsided.

The first treatments produced an exacerbation of the pulmonary process, the quantity of moist rales increased and appeared at places where previously increased respiratory sounds and crepitation were heard. The temperature rose one or more degrees (this applies

to our Fahrenheit scale only) in the course of two to six days. But after this first reaction had subsided, acceleration of the process of cicatrization took place. The moist rales were replaced by dry ones, these again by increased respiratory sounds, while the amphoric breathing over the cavities was replaced by bronchial breathing, rarely by crepitation rales.

The roentgenologic examination showed that sharply circumscribed cirrhotic foci replaced the diffuse infiltrates. In the sputum the bacilli lessened in number while the elastic fibres disappeared. As a rule the temperature fell to normal. The patients increased in weight and their general condition improved. In all cases with dry pleurisy the pains disappeared. In patients with exudative foci the initial exacerbation lasted one to one and a half months and improved slowly.

Considering the above as a sort of clinical experiment, the authors come to the conclusion that the x-rays represent a very active therapeutic adjuvant, which accelerates the natural healing process.

New Colorless Protective Spectacles for Ultraviolet Radiations. Dr. Grober. Munchen. Med. Wchnschr., 1928, No. 26.

Dr. Grober describes glasses manufactured by the firm C. Zeiss, which have the great advantage over colored glasses of allowing perfect visibility and at the same time being absolutely impermeable to the ultraviolet rays.

These glasses will prove of special value for children who undergo general ultraviolet radiation, as they can play while undergoing the treatment, every object being as clearly visible as through ordinary glass spectacles. The author makes the recommendation that the old colored protective glasses be discarded and the colorless glasses be adopted instead.

Epithelioma of the Parotid Gland Successfully Treated with X-Rays. Drs. E. and P. Goinard. Presse Med., 1928, No. 56.

In a case of a man 76 years old who had an epithelioma of the parotoid gland as large as a child's fist, which was adherent both to the skin and the deeper structures, the application of the x-rays reduced the growth to the size of a small nut, after which it became operable, especially so, and this is particularly noteworthy, because the tumors also became freely movable.

Another case very similar in character remained cured for four years after treatment by radium.

X-ray Treatment of Brain Tumors. Drs. A. Stoermer and Dr. P. P. Gotthardt. Strahlentherapie, No. 29.

The authors present views which add a ray of hope in the sad chapter of medicine dealing with brain tumors. They, of course, demand surgical operation for all operable cases, and stress the value of the x-rays in inoperable cases, especially the glioma, which are so rich in cells.

Of 34 cases the authors obtained improvement bordering on cure in about 29 per cent, while prolonged improvement was noted in 20 per cent of the cases. In the remaining cases the improvement was so temporary as to allow being classified with the remaining 51 per cent as failures.

The authors point out that tumors of the cerebellum particularly respond to x-ray therapy.

Radiotherapy in the Treatment of Hodgkins' Disease. Drs. Haret and Lifchitz. Am. J. Physical Therapy, 50:354-356, Nov. '28.

The experience which the authors have had in employing radiotherapy in Hodgkin's disease is somewhat encouraging. It has been proven that surgical procedures are very seldom satisfactory and many times tend to hasten the extension of the disease. A few cases are cited where radiotherapy treatments were given to check this malignancy and although after a series of treatments, there was a recurrence of the disease, the symptoms would disappear for a short period and gave at least temporary relief for several months.

X-Ray Therapy in Gynecology. O. R. Stafford. Am. J. Physical Therapy, 50:351-353, Nov. '28.

X-ray therapy in nearly all previous articles, when advocating its use in women's diseases, deals with only malignancy. This paper treats with some of the other diseases common to women.

Chronic mastitis has responded very well to x-ray. It is the author's belief that all fibroids of the uterus should be treated by x-ray except the large pedunculated fibroid and this type should be removed surgically. Among other diseases successfully treated by the above method are menorrhagia, metrorrhagia and dysmenorrhea. Many of the disorders of the menopause have been greatly relieved by x-ray treatments.

Rejuvenation of women, according to the author, and from his observations on this subject, may be accomplished by means of the x-ray.

Co-ordinating the Physical Therapy Department. S. T. Snedecar. J. Med. Soc. New Jersey, 25:692-695, Nov. '28.

Physical therapy should be an important branch in every hospital. In the Hackensack hospital, the average totaled over 25 patients each working day, as having been treated in the physical therapy department. This branch must be fully equipped, properly organized and it must be co-ordinated with the other various departments in the hospital.

Our Annual Winter Infections of the Respiratory Tract in Childhood. A. Stern. J. Med. Soc. New Jersey, 25:704-707, Nov. '28.

Diseases of children which are peculiar to cold weather present a more difficult problem in securing a cure than do those which are most common during the summer. Sobel is quoted as saying that one-fifth of all deaths under one year, and one-fourth to one-third of all deaths in children under 5 years of age are chargeable to diseases of the respiratory tract. The author

states that the majority of cases under his control responded most favorably to early instillation of 25 per cent adrenalin solution 1:1000 at hourly intervals of twenty-four hours. He does not suggest any new methods in treatment. Fresh air is an important adjunct in the prevention of diseases of the respiratory tract.

Physical Measures as an adjunct to Surgery. W. Martin. J. Med. Soc. New Jersey, 25: 671-676, Nov. '28.

Physical therapy has become prominent only in the past ten years and during this time it has steadily increased in popularity. Among the many various uses of physical therapy are: The application of diathermy to prevent post-operative shocks; prevention of post-operative pneumonia; healing of fractures and sprains and all kinds of wounds; paralysis following injuries respond favorably to this treatment. One of the newer fields for diathermy is burns. From experience it has been found to bring quicker results in healing if applied to the burn early.

Some of the Less Known Uses of Roentgenotherapy. I. S. Trostler. Am. J. Physical Therapy, 50:299-306, Oct. '28.

Taken altogether, the roentgen rays are applicable in the treatment of a very wide range of diseases. The author purposely refrained from enumerating quite a number of conditions and diseases where they have been used, but where there is some question as to the efficacy of the method, and which he still considers as clinical experiments.

In many of these questionable conditions our European colleagues are daily using the roentgen rays. Recent literature, particularly from Germany, is full of it. Whole books are published upon it; one of the examples is Kleinhardt's "Roentgenotherapy of the Ear, Nose and Throat."

The Treatment of Epitheliomata of the Skin with Roentgen Ray and Radium Therapy. G. F. Jackson. Urol. and Cutan. Rev., 32: 788-790, Dec. '28.

In this article is shown that there is no field in medicine in which radium and roentgen therapy give more satisfactory results than in the treatment of epitheliomata. Radium is valuable not only in malignant but also in benign conditions. The roentgen ray is also of greatest assistance employed in conjunction with and subsequent to the use of radium. By such combined methods of attack, not only are many cures obtained, but even in unfavorable cases great betterment of symptoms usually follows. In the relief of pain produced by metastasis, roentgen ray therapy gives really amazing results. The author's experience would seem to warrant the following conclusions: The best treatment of epitheliomata is a combination of roentgen ray and radium therapy, with radium applied to the surface of the lesion. Radium alone has been very successful in handling this type of lesion. In my experience the results obtained by the combination of roentgen radiation with radium are better than any other method that we have at our command.

Some New Views in Electrical Ionic Therapy. H. U. Cross. Presse Med., Vol. 36, No. 34, 1928.

The author used x-ray pictures to study the penetration of substances administered by the galvanic current. The movement of the given substances (lead and iodin were used) could be observed in the model as well as in the living tissue in animal experiments. Incidentally the iodin penetrated three times as fast and deeper than the lead (from a lead nitrate solution).

The penetration of the ions is sharply localized in the regions of the electrodes. Nevertheless, the heavy metals showed a tendency to penetrate into the tissues. The medicines administered by iontophoresis were maintained longer in the tissues than those administered by mouth or by subcutaneous injections; this explains the late recovery in the urine. This also explains the long duration of the local anesthesia caused by iontophoresis. In the practical application of iontophoresis, it is advisable to limit toe dimensions of the active electrode as much as possible. Furthermore, direct contact of a metal electrode with the tissues is to be avoided in the administration of metallic ions (as for example zinc sulphate solutions in ulcerations). In such cases this is accomplished as follows: Several drops of the solution are placed on the tissue and the dropper held in such a way during iontophoresis that the solution alone forms a connection between the cannula which serves as the active electrode and the body. The behavior of the perimeter during iontophoresis is as follows: When the current intensity rises rapidly it shows a good penetration of the ions; on the contrary, a weakening of the current during a session shows only slight ionization. If after the current has reached a maximum strength it still continues to rise, a lesion in the skin is indicated, and the session should be interrupted and the place of application changed.

Treatment of Irreducable Procidential Hemorrhoids. Bensaudt and Meyer. Jour. des Practiciens, October 29, 1927.

When after many tedious procedures, which take a long time, a reduction is finally made, the best means to cause the pains to subside is the application of diathermy, but very often one is obliged to have recourse to surgery.

The authors, however, propose another course. The procidential hemorrhoids can be reduced without forced dilatation by using diathermic electrodes. At each session there is a remarkable improvement which lasts several hours. Twelve hours after the second session, one can notice a marked diminution in the congestive phenomena. In all cases, after twenty-four or thirty-six hours, the great pains ceased and the procidentia was easily reduced, very often spontaneously. Until now, the method has been applied to 16 patients.

Diathermo-Coagulation in Tumors of the Oropharynx. Leroux and Tilman. Progres Med., October 20, 1927.

This is a comprehensive review, which takes account of foreign work, and explains the technic applicable to the different cases.

The only tumors in which the method is indicated are the epitheliomas, because they remain localized for a long time. Epitheliomas of the tonsils and those of the soft palate are the most favorable. If the lesions extend to the hard palate, necrosis of bone and sequela may result, or if one does not act energetically enough, metastases may result. When the cancer from the tonsils extends to the tongue, a gross destruction of the lesions cannot be obtained because of the abundant lymphatic drainage; the tonsil is seen to recover, whereas the metastases grow in the tongue. In neoplasms of the floor of the mouth excision is not satisfactory; it is better to have recourse to diathermo-coagulation. The authors have a cure of fifteen months' duration.

Diathermo-coagulation is recommended for its easy technic, absence of serious risks and complications, and the possibility of treating all the metastases.

Action of Ultraviolet Rays on Organic Nervous Diseases of the Motor Type. Nobecourt, Duhem and Bize. Rev. d'Actinol., Oct., '27.

In a certain number of cases the authors have observed good effects on the tonicity of the muscles and spasmodic phenomena of Little's disease. They report in detail an observation of a severe case of Friedreich's disease, which showed considerable improvement, as well as a case of atrophic myopathy of the Charcot-Marie type. They have also seen three primitive myopathies, and one amyotrophy of the Charcot-Marie type which seemed to have been favorably affected. In four cases of multiple sclerosis, in two cases of congenital myasthenia, and in the motor symptoms of Parkinson's disease, they have had encouraging results, but are of the opinion that one should await the proof of time.

Treatment of Coryza by Diathermy. Baratoux. J. de Med. de Paris, Dec. 15, 1927.

The majority of the treatments have very slight efficiency, except atropin sulphate which most frequently gives successful results.

Diathermy, according to the technic of Tsinoukas, of Athens, *employed in the beginning,* always gives successful results; it is very exceptional if the patient does not obtain immediate improvement. One session is often sufficient for a cure, sometimes two or three are necessary.

Biochemistry of Scurvy. Mouriquand and Leulier. J. de Physiol. et de Path. Gen., Vol. 25, No. 2, 1928.

The authors come to the following conclusions: In vitamin deficiency C, the greatest disturbance exists in the iron and cholesterin content. The disturbance in the iron content is concomitant with the development of the scorbutic syndrome and anemia; the iron disturbance disappears with the healing of the latter. The cholesterin content is normal in the blood, liver, lungs and spleen; it is decreased at least to half in the adrenal glands. Tuberculosis, complicating scurvy, still further decreases the cholesterin content of the suprarenal glands. The glucose content seems to be unchanged. There is no loss in the calcium or phosphorous content of the bones, even though there is gross fragility.

Effect of Cocain on the Chronaxy of Sensory Nerves. Cardot and Regner. J. de Physiol. et de Pathol. Gen., Vol. 25, No. 1, 1928.

A dose of over 0.05 per cent of cocain chlorhydrate very quickly destroys the irritability of sensory nerves. With a dose of 0.05 per cent or more there is a proportionately greater reduction in the chronaxy relative to the increase in dose. For a certain time it remains at a minimum; it then again rises to the initial value or surpasses it. The effect then becomes similar to that on the motor nerves, but the latter requires at least ten times greater doses.

Diathermy or Galvanism. J. Kowarschik. Wien. Klin. Wchnschr., Vol. 41, No. 15, 1928.

The author prefers galvanization to diathermy in the treatment of neuralgias and neuritides; the former has a specific analgesic effect. It should be employed in a proper form, particularly with sufficient dosage. The dosage is usually 10 to 20 times too low. Kowarschik uses current strengths of 10 to 150 ma. at a session lasting from twenty to thirty minutes. For such doses to be borne the technic must be exact. The author uses zinc plates of 100 to 200 square cm. with pole clamps. With each application there is placed under these plates a friction cloth folded eight times, and extending 2 cm. in all directions beyond the zinc plate. This is soaked in warm salt solution, thereby decreasing the current sensitivity. The electrodes are then enveloped in elastic bands. The most ideal conditions are obtained if one electrode is used as a bath. Cauterization is avoided. There is no pain, but only a feeling of warmth. It makes no difference whether the cathode or the anode is used as the active electrode. The analgesic effect is not due to anelectrotonus but to chemical and osmotic processes. The friction material must be washed each time and must be boiled once a week with a weak solution of acetic acid in order to dissolve the metal salts. With this technic, galvanism has better results in neuralgias and neuritides than diathermy.

The Effect of the High Frequency Current on the Skin. I. I. Schimanko and L. S. Herman. Arch. f. Dermat. u. Syph., 154, 3, 1928.

The high frequency current and the spark discharges during its passage, have an unequal effect on the skin. The sparks are the more effective factors and a differentiation is made between the purely mechanical effect

on the skin, and the reactivity of the skin (sensitization) as brought about by the sparks. The bipolar method has a stronger traumatizing effect, the sensitizing effect being less. Skin eruptions may occur (sensitization) after the application of the d'Arsonval current in patients with increased reactivity. In these cases the application of strong sparks is contra-indicated. Patients who have especially sensitive skins are to be treated with a current without sparks.

Local Treatment of Lichen Planus by Ultraviolet Rays. Juster and Tchiprout. Bull. Soc. de Dermat. et Syph., 1, Jan., 1928.

Juster and Tchiprout have combined medium radiotherapy of lichen planus with local baths of ultraviolet light of an erythematous dose. Often, indirect radiotherapy only causes the patches to fade, whereas the papules disappear completely after ultraviolet light which at the same time has a favorable effect on the pruritus.

The combination of the two methods shortens the duration of the treatment.

Angiopathies and Diathermy. Zimmern. Progres Med., Oct. 22, 1927.

Diathermy has no effect on arterial calcifications nor on permanent hypertension of renal origin. But as generalized applications it is used in young individuals, plethoric individuals and women in the menopause.

Local transcardiac diathermy may be used in the same patient, and is useful in benign nervous angina pectoris; when there are changes in the large vessels and coronary arteries, improvement may be obtained, but the pulse should be controlled, and the facial expression should be watched during the session.

Local applications give good functional results in intermittent claudication, and in certain cases increase the oscillometric index.

Diathermy either in the form of condensing beds, or as local applications, gives good results in Raynaud's disease.

It also acts on the circulation and hepatic function, on stasis of the abdominal viscera, on certain migraines, and on certain ear affections.

On the Treatment of Acute Poliomyelitis. Results Obtained during the Epidemic which Occurred in Roumania during 1927. Marinesco, Manicatide, Draginesco and Rosiano. Bull. Acad. de Med., 5, Jan. 17, 1928.

Treatment varies with the different phases of the disease, with the pre-paralytic period and with the course of the paralysis. The authors at first give the results obtained with convalescent serum (Netter's method) and with Pettit's serum, then the results obtained with the autohemotherapy, as advised by Sicard, and with heterohemotherapy. Finally they report the cases in which, after the acute phenomena have subsided, they employed the treatment advised by Bordier, radiotherapy combined with applications of diathermy.

From the detailed analysis of nine such cases, the authors conclude that radiotherapy, even combined with diathermy, and administered from the first days of the paralysis, has not given superior results to those observed in the spontaneous evolution of the disease.

From the observation of 12 other cases which they could only follow for two weeks, the authors conclude: "The results which we have obtained with radiotherapy do not give us the conviction that it is an efficacious treatment." The treatment of choice seems to them to be a combination of diathermy and the galvanic current. Nevertheless, the results obtained following this treatment do not differ markedly from the results observed in 52 cases in which the paralytic phenomena have followed their natural evolution, without treatment.

Problem of Treatment of the Follicular Gonorheal Urethritis in Diathermy. D. Liebfried. Urol. & Cutan. Rev., 33:35-37, Jan., 1929.

Diathermy is the most helpful method in the affection of the follicular apparatus of the urethra.

Higher therapeutic doses give a greater curable effect; weak doses may serve for the purpose of provocation.

A parallel sitting of both electrodes on the penis is the most rational, since it creates favorable conditions for the passing of the current.

The Use of Radium in Malignancy and Certain Gynecological Conditions. T. W. Holmes. New Orleans Med. & Surg. J., 81:477-480, Jan., 1929.

Radium has been employed for twenty years in the treatment of gynecological diseases and it now occupies a position co-ordinate with surgical and medical measures. About 96 per cent of cancers of the cervix are in women who have borne children with a history of miscarriages or instrumentations. The only way to combat the high mortality resulting from this condition is by its early recognition. There are nearly 20,000 deaths from cancer of the cervix in the United States each year. Thirty-five per cent of all cancers occurring in women have origin in the uterus and about 98 per cent of those develop in the cervix. Of fifteen inoperable cases in this series, treated with radium, two died, five living four years after treatment; five, three years.

Radium in the Treatment of Uterine Diseases. W. W. Crawford. New Orleans Med. & Surg. J., 81:474-477, Jan., 1929.

Radium has proven beneficial to patients suffering with uterine bleeding. Seventy-one patients were treated, ranging from 12 to 57 years. The dosage was administered accordingly, young girls and women received a smaller amount than women over 40. It was noted in one patient who was excessively fat and nervous that after the treatments she was no longer nervous and had lost 50 pounds. Very few large fibroids should

be given radiation. If the first treatment does not cause a decrease in size, subsequent treatments very seldom have any effect. Carcinoma is usually too far advanced for surgical treatment, hence radium is becoming the method of choice. It would seem that to complete the treatments within a week instead of administering smaller doses for several weeks would give better results.

Filtered Ultraviolet in the Diagnosis of Ringworm Infestation of Hairs. H. Goodman. Clin. Med. & Surg., 36:44-45, Jan., 1929.

There are two requirements for detecting the presence of fungi in the hairs of the scalp: (1) A source of ultraviolet emanation which gives a limited infra-red emanation; (2) a filter which permits the passage of invisible ultraviolet radiation, but prevents the passage of the visible radiations. Two filters which are available for this purpose are the nickel filter of wood and the Corex red or blue-purple glass. The author describes his method of diagnosis by this means and states he has had satisfactory results.

Cancer and Malignant Tumors of the Neck. I. Silverman. Long Island Med. J., 23:31-39, Jan., 1929.

Owing to the large variety in the results reported on malignancy of the thyroid, to attempt to quote its incidence would be of little value. Clinically three types of tumors can be recognized:

1. Primary malignant tumors not associated with adenomas.
2. Tumors arising secondary to adenomas.
3. Tumors showing a slow growing primary lesion with large secondary deposits, especially in bone.

Radiation has given the best results in lymphosarcoma and Hodgkin's disease and is recommended as the method of choice.

The Technical Perfection of Roentgen Ray Cinematography. Fr. Groedel (Bad Nauheim). Band XXXIX Ausgegeben, January, 1929, Heft 1 Fortschritte auf dem gebiete der Roentgenstrahlen.

This long desired object can only be obtained by a change in cinematographic technique as regards film size, i.e. to the dimensions of the dimensions of the Roentgenray image.

The apparatus built by Groedel nearly twenty years ago has been further improved and now gives films which show 16 exposures per second of the pulsating heart.

The apparatus built for this purpose corresponds to the normal cinematographic camera. A strip of film 24 cms. width is passed intermittently between two intensifying screens of size 18 × 24 cms. and the intensifying screens are pressed together and then separated in synchronization with the intermittent motion.

All other details are obvious from the illustrations.

Peptic Ulcer of the Esophagus. W. F. Zinn. Am. J. Med. Sc., 177:1-14, Jan., 1929.

Although peptic ulcers of the esophagus are rare, they occur sufficiently often to be of clinical interest. They are usually observed in the lower third of the esophagus though occasionally they are located higher. These ulcers vary greatly in size and are usually single; the right posterolateral wall being most frequently involved. They resemble in many respects ulcers of the stomach and duodenum. Perforations are not uncommon. In large ulcerations, contraction takes place with the formation of stenosis and dilatation. In the small superficial ulcerations, healing is usual and esophageal lesion is apt to be overlooked. The etiology of peptic ulcer of the esophagus in every respect is similar to that of the stomach and duodenum. In order that this affection may occur, it is necessary that the cardia remain patent so that the regurgitated acid gastric secretion may continue its corrosive effect upon the diseased area in the mucous membrane of the esophagus.

Ulcerations of the esophagus have been most frequently observed in adults more commonly between the 30th and 70th years and are found equally divided between males and females.

The most prominent symptoms of the disease are pain, dysphagia, vomiting, hemorrhage and perforation. There is often great difficulty in arriving at a diagnosis. However, this may be greatly aided by means of fluoroscopy and esophagoscopy. The treatment consists in the eradication of foci of infection, rest, the regulation of the diet and the administration of olive oil, alkalies and belladonna and at times by the direct application of the diseased area of various remedies such as a solution of nitrate of silver through the esophagoscope. If healing does not occur following this plan of treatment, gastrostomy should be performed to insure adequate feeding and the esophagus kept at rest for a considerable period of time.

A Contribution to the Diagnosis and Therapy of Thymic Hyperplazia. Ph. Zoelch (Munich). Band XXXIX Ausgegeben, January, 1929, Heft 1 Fortschritte auf dem gebiete der Roentgenstrahlen.

In the radiographs of two children aged 6 and 15 months, lateral extensions of the right heart shadow were found and were considered as being due to congenital defects of the ascending aorta.

In one case the question of thymic hyperplaza was considered in the differential diagnosis. The retrogression of the shadow and the rapid improvement of the clinical sympotms (lessened stridor, dysphagia and lymphocytosis) on roentgen ray treatment, confirmed the diagnosis.

In the second case complete relief of symptoms was only obtained accidentally, with retrogression of the mid field shadows within a very short space of time (within four weeks). The therapeutic effect in this case must be attributed to the numerous diagnostic roentgen ray examinations which had been made.

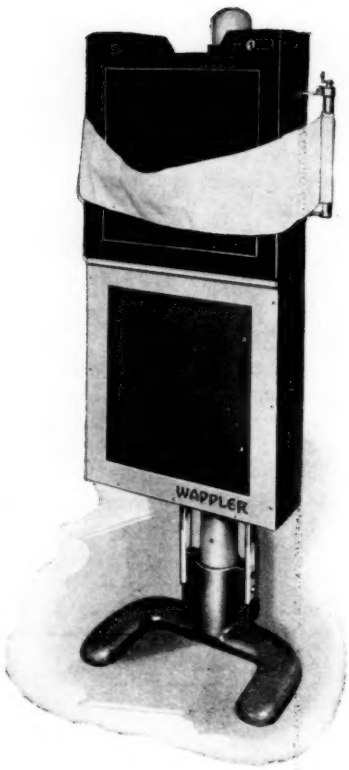
Simplifying X-Ray Stereoscopy

Because of the bulk and high initial cost of apparatus for the taking and viewing of stereoscopic X-Ray films, many offices and laboratories have had to forego the benefits of stereoscopic examinations. With the perfection of these two new pieces of equipment, these difficulties have been removed.

Wappler Hand Stereoscope

Weighing only 4 pounds and measuring only 17x6x4½ inches, this compact simple apparatus is easily held before the eyes with one hand. For teaching and consultation, as many as four persons may view films at the same time. For prolonged study of films a light adjustable stand is available. Adjustment for perfect focusing and true stereoscopic vision is easily made.

Write for illustrated folders "CS-K."



Wappler Vertical Cassette Changer

A remarkably compact apparatus—occupies a floor space measuring only 24″ wide by 18½″ dep. A simple counterbalanced cassette changing mechanism is used, accuated by gravity. Quick and silent in operation and remarkably free from jar or after-vibration.

WAPPLER ELECTRIC COMPANY, Inc.

General Offices and Factory, Long Island City, N. Y.
Show Rooms, 173 East 87th Street, New York City.